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## THE MANAGEMENT OF IRREGULAR MENSES

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IN THE management of irregular menses, we must first establish some criterion for what we consider normal menstruation. It is assumed by most gynecologists that menstrual cycles of from 21 to 40 days and bleeding periods of three to seven days in duration, fall within normal limits. Almost all women have individual variations and the absolutely regular cycle is a clinical rarity.

The most common menstrual disorders are menorrhagia (excessive bleeding per diem or prolonged flow), metrorrhagia (acyclic uterine bleeding), and amenorrhea (the absence of menstruation).

Uterine hemorrhage due to complications of pregnancy will not be considered in this discussion because they are not, strictly speaking, disorders of menstruation.

*Menorrhagia and metrorrhagia* due to constitutional abnormalities, such as: blood dyscrasias, psychic disturbances, malnutrition, syphilis, and cardiac decompensation may be the only symptom of a systemic disease. The treatment is directed towards the origin of such bleeding and I often invite the help of a psychiatrist or interne without embarrassment.

Uterine bleeding due to endocrinopathy and commonly called "functional uterine bleeding" or "dysfunctional uterine bleeding" is the most common and often the most disappointing to treat. This type of bleeding usually occurs during puberty and the childbearing age. Here, the pituitary-ovarian-uterine mechanism is out of order.

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There is no single therapeutic agent effective in every instance of dysfunctional uterine bleeding. The following measures are used to arrest the bleeding:

1. Curettage will usually stop the bleeding, if only temporarily, and it eliminates the possible presence of an intra-uterine lesion. We may expect approximately a 50 per cent cure rate from this procedure.
2. The injection of 2 cc. of pitressin tannate in oil as advocated by Benson will often control the bleeding temporarily.
3. The administration of 1,000 international units of chorionic gonadotropin daily until bleeding subsides and then every other day or twice a week until a total of 10,000 to 15,000 units have been given. The results are often encouraging.
4. Testosterone propionate in dosage of 50 to 100 mg. injected intramuscularly every other day, until a total of 300 mg. has been given, will often suppress estrogen production through inhibition of the gonadatrophic function of the anterior pituitary gland. In milder cases of bleeding, the use of methyl testosterone, in dosage of 20 to 30 mg. daily by mouth may produce the same results. This should not be continued for longer than 20 to 30 days for it may evoke masculinizing changes.
5. Large doses of estrogens are employed to obtain the so-called medical curettage and/or to maintain the blood estrogen level above the so-called bleeding line. This may be accomplished by the oral administration of diethylstilbestrol in amounts as high as 500 to 1,000 mg. daily, if the patient can tolerate this. The conjugated natural estrogens are often better tolerated by the patient. Recently, Greenblatt and Barfield have advocated the intravenous administration of an aqueous solution containing 20 mg. of conjugated natural estrogens. This amount is repeated every 6 to 12 hours for two to four doses or until cessation of bleeding. After initial arrest of the bleeding by administration of estrogens intravenously, a regime of oral estrogen therapy in diminishing doses, followed by a course of cyclic progesterone therapy was satisfactory in establishing the menstrual cycle.
6. Progesterone administered by injection of 20 to 30 mg. daily for four or five days often controls the bleeding in much the same way as estrogen therapy.
7. Luteotropin (prolactin) has been used in the control of menorrhagia by Hall and Kupperman. They employed a dosage of 100 to 250 international units injected daily during the period of abnormal bleeding. I have had no experience with this hormone.
8. The combination of testosterone-progesterone and estrogen-progesterone-testosterone is often quite satisfactory in the arrest of uterine bleeding.
9. Wedge-shaped resection of the ovaries may convert the irregular bleeding to cyclic menstruation.
10. Intra-uterine radium and hysterectomy should have no place in the treatment of dysfunctional uterine bleeding of puberal girls and young women of childbearing age. Such treatment should be instituted only as a life-saving procedure.

To prevent the recurrence of dysfunctional uterine bleeding in this

age group, we should attempt to improve the general health of these patients by proper diet and adequate vitamin intake. The empirical use of a small dose of desiccated thyroid cannot be overestimated. A dose of thyroid U.S.P.,  $\frac{1}{2}$  grain daily, may be all that is necessary to control uterine bleeding. Low-dosage irradiation of the pituitary gland and ovaries, when the aforementioned measures fail, may be helpful. We must remember, however, that menometorrhagia is often followed by periods of amenorrhea, and if this occurs following irradiation, the patient may blame her malady on the roentgenotherapy.

Dysfunctional uterine bleeding, occurring before and during the menopause, usually signifies ovarian failure and nothing at our disposal can stimulate an aging ovary. The choice of treatment requires mature judgment and it varies considerably from that employed in adolescent girls and women of childbearing age.

The proper therapeutic measures are:

1. A diagnostic curettage should be done immediately. Again, this primary investigational procedure often affects a cure.
2. If the curettage revealed no pathologic condition, then the oral administration of methyl testosterone 10 mg. three times a day for one month, followed by 10 mg. daily for two months gives very satisfactory results. Testosterone usually hastens the involution of the ovaries and endometrium without precipitating climacteric symptoms.
3. Estrogen therapy is mentioned only to be condemned.
4. I believe that radium and roentgenotherapy should be reserved for malignant conditions. However, when other methods fail and the physical condition of the patient prohibits surgery, then 1200 mg. hours of intra-uterine radium will control the abnormal bleeding.
5. Persistent or uncontrolled bleeding may require a total hysterectomy and bilateral salpingo-oophorectomy. Postmenopausal uterine bleeding should be considered to be due to a malignancy until proved otherwise.

The management of postmenopausal bleeding, even when malignancy is ruled out, should invite more radical treatment. In my opinion, a total abdominal hysterectomy with a bilateral salpingo-oophorectomy insures results which cannot be accomplished by any other treatment.

Uterine bleeding caused by organic lesions of the pelvic organs such as neoplasms and inflammatory conditions can be diagnosed, with few exceptions, by physical examination and biopsy specimens.

Benign neoplasms of the cervix or corpus uteri, such as polyps and fibroids, are best handled by excision or hysterectomy.

Endometriosis and adenomyosis very often produces abnormal

uterine bleeding. The conservative treatment consists of the oral administration of diethylstilbestrol 5 mg. daily with a weekly increase of the daily dose by 5 mg. for a period of three to six months. The conjugated natural estrogens may be better tolerated. Testosterone may give good results, but the undesirable masculinizing symptoms limit its use. In refractory cases, surgery is curative if castration is accomplished. More conservative surgery is indicated in those patients of childbearing age and when the childbearing capacity is to be maintained.

Squamous cell carcinoma of the cervix, adenocarcinoma of the cervix and adenocarcinoma of the endometrium usually produce uterine bleeding before any other sign or symptom. The location of the lesion, the cell type, and the mode of extension of squamous cell carcinoma and adenocarcinoma of the uterus are different and the treatment is usually different. In the past few years I have treated the two in very much the same way.

Patients with carcinoma of the cervix are given an intensive course of external irradiation utilizing four or six portals supplemented, when necessary, by transvaginal portals to achieve a tissue dose within the midpelvis of between 3,000 and 3,500 roentgen rays. Following the subsidence of the local irradiation reaction (usually within four to six weeks), further irradiation dosage is obtained through the application of radium. This may be satisfactorily accomplished through the use of radium in tandem formation within the cervical canal and uterine cavity with additional containers placed laterally on each side and held in position by some form of colpostat. In our hands the Ernst applicator has proved convenient and has the additional advantage of providing a more uniform distribution than is possible by other means. Assuming the administration of 8,000 mg. hours as recommended by Ernst as a maximum for a single application, it has been calculated that approximately 12,500, 7,000 and slightly less than 4,000 gamma roentgen rays are delivered to points 1.5, 3 and 5 cm. respectively lateral to the midline at the level of the internal os.

Treatment of carcinoma of the body of the uterus is best accomplished as in carcinoma of the cervix through a combination of external irradiation and radium. The external irradiation is initially given, and multiple abdominal portals are utilized in order to achieve a tumor dose within the uterus of 2,500 to 3,000 roentgen rays. Shortly thereafter the radium is applied. In our hands this has been neatly accomplished through the use of multiple Campbell applicators packed evenly within the uterine cavity and cervical canal with, in some cases, additional containers placed in each lateral fornix.

Ten milligram elements are used in each container; the filtration totals 1 mm. platinum equivalent. As a general rule, eight to ten applicators may be used for a total of 80 to 100 mg. While obviously somewhat variable depending upon the distribution of the applicators, 5,000 mg. hours will generally yield a calculated tumor dose of somewhere between 4,000 and 5,000 gamma roentgen rays minimum.

Following the subsidence of the irradiation reaction these patients have a radical hysterectomy of the Wertheim type.

Granulosa cell tumors and theca cell tumors of the ovary require immediate surgery. A pelvic mass, with or without uterine bleeding, occurring in a patient near the menopause should be operated upon immediately.

Uterine bleeding due to acute inflammatory conditions of either specific or nonspecific organisms are treated by a conservative regime including large doses of antibiotics. Chronic inflammatory adnexal diseases giving rise to bleeding and debility require surgery.

*Amenorrhea*, like menorrhagia and metrorrhagia, may be the only symptom of a local or constitutional disorder. It is termed primary when menstruation had never occurred and secondary when menstruation had previously occurred.

Pituitary derangements such as: adiposogenital dystrophy (Froehlich's syndrome), pituitary cachexia (Simmonds' disease), and pituitary adenomas (Chromophobe, basophile, and acidophil) produce amenorrhea. The amenorrhea of adiposogenital dystrophy is occasionally helped by low dosage irradiation of the pituitary gland and ovaries. A Polyhormonal extract of the pituitary gland and the sex hormones are indicated in Simmonds' disease. Roentgenotherapy, radium and neurosurgery offer the only hope of cure in pituitary adenomas. The treatment of amenorrhea caused by the above conditions is generally disappointing.

Primary ovarian failure always causes amenorrhea and there is no effective treatment which may be administered. Cyclic substitution therapy will produce an artificial menstruation, but offers no cure. Low dosage irradiation of the ovaries may be the most effective agent in restoring menstruation and, if properly administered, can do no harm.

Masculinizing tumors of the ovary and of the adrenal cortex produce amenorrhea. The menstrual derangement may only be alleviated after surgical removal of the tumor.

Amenorrhea caused by a purely uterine defect is congenital and very often permanent.

Malfunctions of other endocrine glands, namely, the thyroid and adrenals, as well as derangements of the nervous system, voluntary and involuntary starvation, and debilitating diseases, often cause amenorrhea indirectly by virtue of the influence on the structure and function of the pituitary gland and ovaries.

Menstrual disorders secondary to hypothyroidism will respond to thyroid therapy. Desiccated thyroid substance should be given in gradually increasing doses, gauged carefully by pulse rate and periodic estimation of the basal metabolic rate. Toxic adenomas of the thyroid gland and Graves' disease present the opposite extreme of hypothyroidism. They, too, produce amenorrhea, which is amenable only after medical and/or surgical treatment of the hyperthyroidism.

The treatment of menstrual disorders associated with severe mental diseases is within the scope of psychiatry and is directed towards the emotional factors responsible for the amenorrhea.

#### SUMMARY AND CONCLUSIONS

The management of irregular menses is presented in the light of a deranged pituitary-ovarian-uterine mechanism. Many varied treatments are given for the control of abnormal uterine bleeding. There is no single therapeutic agent which will establish normal cyclic menstruation. The intelligent treatment of irregular menses depends upon the correct etiologic diagnosis. The judicious use of desiccated thyroid, the sex hormones, roentgenotherapy, radium, the curette and surgery in the hands of a competent gynecologist offers the best therapeutic approach to the management of irregular menstruation.

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## PERFORATION OF GASTRIC ULCER IN PREMATURE NEWBORN WITH OPERATION AND SURVIVAL

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IN 1858 Carteaux<sup>1</sup> reported the first fatal case of perforated ulcer of the stomach in a newborn infant. Subsequent publications have carried several articles on peptic ulcer in newborn infants. The great majority of cases have been diagnosed at autopsy. An idea of the rarity of the condition may be gained from the studies of Smythe,<sup>2</sup> in which the incidence was two gastric ulcers in 9212 newborns. The world literature contains approximately 300 cases of peptic ulcer in the neonatal period, few of whom had operations. The mortality has been very high. Bird, *et al*<sup>3</sup> reported 80 per cent mortality in those with perforation and operation in their series. One of their cases, a duodenal perforation, survived. Tudor<sup>4</sup> reported 19 perforated peptic ulcers in newborns, 6 of which were operated upon and none was listed as surviving. Kellogg, *et al*<sup>5</sup> reported in September 1951 a newborn with a perforated gastric ulcer that was operated upon and survived. These authors stated that their patient was the first case of gastric perforation recorded in world literature operated upon with survival. Examination of subsequent publications makes it apparent that our case is the second perforated gastric ulcer in the newborn to survive operation.

Several factors are considered to have bearing on the incidence of gastric ulcer in the newborn. Direct trauma, either to the abdomen or to the stomach from within, as a result of passing of tubes, infection and local disturbances of circulation from congestion or embolism are mentioned. Such an ulcer occurs rarely as a complication of congenital syphilis. It may accompany erythroblastosis fetalis. Injury to or stimulation in the region of the cerebellum may lead to the development of peptic ulcer. Gastric acidity during early infancy probably plays an important role in the production of peptic ulcers. The maximum acidity is usually reached within the first 24 hours of life, then falls during the next 10 days, gradually rising to normal levels by one month of age.

Diagnosis of ruptured peptic ulcer in the newborn can be made only by careful study and observation, as distention is common normally in these patients. It is rather the unusual degree of distention which should arouse the suspicion of those responsible for the baby's care. Shock, dehydration, early hyperirritability followed by listlessness; a tympanitic abdomen and absence of intestinal sounds on

auscultation are further signs and symptoms of perforation. Roentgenologic examination will show free air in the peritoneal cavity with collapse of the bowel. Opaque oil may be given by mouth to demonstrate the region in which communication between the gastrointestinal tract and the peritoneal cavity exists.

The following case is presented from the records of St. Anthony's Hospital, Oklahoma City:

D. E. S., a Negro female baby, was delivered from the left occiput anterior position with low forceps March 18, 1952, at eight months gestation. The mother, a multipara, was in good health. The infant, in apparently good condition, was placed in an incubator. She received water by mouth in 24 hours and a formula in 36 hours from birth. She passed three meconium stools. On March 21, 70 hours after birth, the baby was noted to be distended and would not take her formula. During the early morning hours of March 22, 72 hours after birth, she was seen by us, representing the pediatric and the surgical departments. Roentgenograms (fig. 1) were made and interpreted as in keeping with a spontaneous visceral perforation.



Fig. 1. Survey lateral roentgenogram of abdomen showing marked amount of free peritoneal air with viscera compressed into a relatively small mass.



Fig. 2. Anterior posterior roentgenogram showing opaque oil free in peritoneal cavity. Oil was given through esophageal catheter and was seen to escape from the stomach or duodenum at fluoroscopy.

Preoperatively the patient was given 15,000 units of penicillin every 3 hours, 125 mg. of streptomycin and 40 cc. of normal saline solution subcutaneously. Later in the morning opaque oil was given by mouth and the roentgenologists noted its prompt escape from the upper gastrointestinal tract

into the peritoneal cavity, although the exact point of escape could not be determined (fig. 2). It was learned that the baby had had no intubations, either for feeding or for tracheal aspiration, until eight hours following the onset of symptoms.

At 1 p.m. on March 22, 85 hours after birth, the patient was operated upon. Upon entering the upper abdomen using a transverse incision, a perforation 3 mm. in diameter in the prepyloric region on the anterior lesser curvature of the stomach, was discovered. It appeared punched out, with no adjacent thickening or edema. A small fragment representing the greater omentum, 1 by 4 cm. in size, extended up toward the perforation, but was not in contact with it. There was a moderate chemical peritonitis but no gross fibrin formation. The perforation was closed with three through and through sutures of No. 00 chromic catgut, into which the omentum was drawn before tying. The same type of suture material was used for the peritoneal closure. The musculofacial portion of the abdominal wall was closed with No. 000 cotton interrupted sutures. The abdomen was not drained. The anesthetic used was ether given by the open drop method with oxygen. The infant was returned to the nursery in fair condition.

The postoperative course was stormy. There was considerable distention. A No. 12 French catheter was placed in the stomach as a safety valve. Oxygen was administered; 15,000 units of penicillin was given every three hours; 125 mg. of streptomycin was given twice daily for 10 days; whole blood transfusions, glucose in electrolyte solutions and 100 mg. of ascorbic acid daily were given. The baby lost from her birth weight of 4 pounds and 7 ounces to 3 pounds and 13½ ounces by the tenth postoperative day. Following this she began to eat well; gained weight and progressed satisfactorily for the following four weeks.

At the end of this time wound healing was complete, and gastrointestinal function was normal. Then the infant developed a severe gastroenteritis which did not respond to antibiotics, but was controlled by placing her on a formula of lactic acid milk. Progress was uninterrupted thereafter, and at her dismissal June 17, 1952, she weighed 10 pounds. Re-examination by the roentgenologic department prior to dismissal failed to show any evidence of ulcer.

#### COMMENTS

Although our experience is limited to the case reported here, certain principles have impressed us as worthy of comment. Prompt diagnosis and surgical treatment are paramount if a newborn with gastric perforation is to survive. Since the fluid and electrolyte reserves of such patients are small and there is a very small and poorly developed omentum incapable of sealing off a perforated ulcer, there is no place for the so-called conservative treatment of ruptured peptic ulcer in babies. The ulcers are acute, with minimal inflammatory or cellular reactions<sup>3</sup> and closure is a matter of simple suturing. Better results in such cases may be expected in the future due to recent advances in understanding of electrolyte and protein balance and means of dealing with their abnormalities, as well as the availability of broad-spectrum antibiotics. After-care is extremely im-

portant in these infants, and it is quite possible to lose one after successful operation unless alert postoperative supervision is pursued.

#### SUMMARY

1. A case of perforated gastric ulcer in a premature infant with operation and survival is presented.

2. This case is the first known survival of a perforated gastric ulcer in a premature infant, and the second survival in the newborn.

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## INTRA-ARTERIAL TRANSFUSION: INDICATIONS AND TECHNIC

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MORE than three quarters of a century has passed since intra-arterial transfusion was introduced and we now find that it is being rediscovered. Halsted's<sup>1</sup> first contribution to American medical literature, a treatise entitled "Refusion in the Treatment of Carbonic Oxide Poisoning" contains a considerable discussion of arterial transfusion. This appeared in 1883. At that time it was generally accepted that it was safer to administer blood or other fluids by the arterial route rather than intravenously. Hueter,<sup>2</sup> who had performed arterial transfusion in 1874, advocated this method in preference to the venous method because he believed the blood coursed more slowly to the heart. Modern research has disproved this contention.

A new impetus for intra-arterial transfusion was afforded by the report of Birillo<sup>3</sup> and independently by Seeley<sup>4</sup> in 1949. Birillo rediscovered Crile's<sup>5</sup> method of cardiac resuscitation using blood and adrenalin intra-arterially instead of saline and adrenalin. Seeley's report stimulated important research on the effect of shock and hemorrhage on the circulation.

We have approached this problem by conducting a series of bleeding experiments in dogs. The information gained from these experiments clearly demonstrates the value of intra-arterial transfusion in certain stages of severe hypotension. These studies have included observations on blood perfusion through the extremities, changes in the size of the heart, and a comparison of the effects of blood replacement by intra-arterial and intravenous methods in the various stages of shock. Also we have gained considerable information from the clinical use of intra-arterial transfusion in hospital practice. From this data we have formulated certain indications for intra-arterial transfusions. The technic of administering blood intra-arterially and the complications incidental to this method will be included in this report.

Any degree of clinical shock can be produced by the direct removal of measured quantities of the circulating blood. A considerable amount can be withdrawn before there are obvious changes in

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the circulation as detected by the usual clinical tests. However, long before sufficient blood has been lost to produce the picture of shock, a serious curtailment in peripheral blood flow has occurred. This can best be demonstrated by the following perfusion experiments in animals.




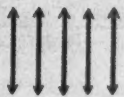
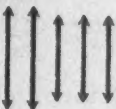




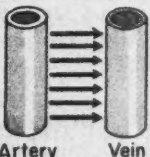
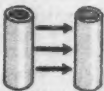

BLOOD VOLUME AND PERIPHERAL BLOOD PERFUSION			
	Normal	Accommodation Impending Shock	Circulatory Failure Clinical Shock
Blood Volume			
Blood Pressure			
Heart Rate			
Blood Perfusion	 Artery      Vein		

Fig. 1. Blood volume and peripheral blood perfusion. Note marked reduction in perfusion before decline in arterial pressure.

In normal circulation of an extremity there is a finely adjusted balance between the inflow of blood through the arteries and outflow through the veins. The ratio between the inflow and output at any given time will be the measure of the perfusion of the blood through the limb. Since it is quite difficult to measure rapid changes in volume blood flow we have devised a simple method which we believe

measures the volume of perfusion rather than the total volume. The basis for this test is simple. When a main vein of an extremity is occluded at a single point it becomes engorged and the venous pressure rises. This engorgement causes the veins to become tense and the normal elasticity is overcome. Now any increase in the vol-

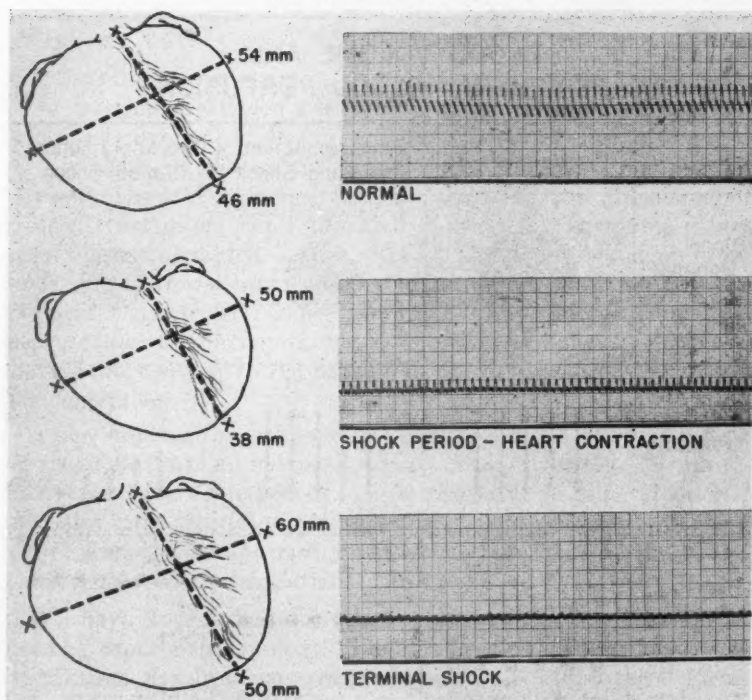


Fig. 2. Heart measurements in a dog, showing normal state, contraction in moderate shock and dilatation in terminal shock. Tracings show blood pressure changes in femoral artery.

ume of blood entering this venous segment will cause a further rise in pressure. A reduction in volume of blood will diminish the pressure. Since the pressure is measured in millimeters of water it is a sensitive test. We have applied this perfusion technic in a series of bleeding and blood replacement experiments in the following manner: A venous pressure apparatus is attached to a femoral vein and the initial pressure is recorded. The vein is then ligated above the canula but just distal to a main tributary. The intravenous pressure rises rapidly after the ligation but soon reaches a peak and levels out. After the elevated pressure becomes stationary, blood is withdrawn from one carotid artery while the arterial pressure of

the opposite femoral artery is recorded on an electromanometer. Blood is withdrawn in 20 cc. syringes and at the end of each withdrawal the venous and arterial pressures are determined. The venous pressure begins to decline immediately but usually as much as 100 cc. or more of blood can be removed before the arterial pressure changes. By the time sufficient blood has been removed to produce clinical shock the venous pressure has fallen below the initial unobstructed level. These experiments indicate that the initial effect of reducing the circulating blood volume is an abrupt diminution in blood perfusion through the peripheral vascular bed. As the volume of blood loss increases not only is there a persistent decline in perfusion but other changes are noted. The peripheral vessels are narrowed. The heart becomes smaller and its musculature firmer. The heart rate increases and the arterial pressure falls (fig. 1). A state of mild or moderate shock then exists. The vascular changes at this stage can be easily reversed by restoring the circulating blood volume. We have demonstrated that in moderate shock both intravenous and arterial infusions are effective. However, less blood has been required when the arterial route has been used. This fact should be remembered when only small quantities of blood are available.

If appropriate treatment is not instituted during the mild to moderate stages of shock, and if further insult is added by the withdrawal of more blood, soon there will be a complete collapse of the circulation. The heart dilates and there is an inadequate filling of its chambers (fig. 2). The aortic resistance is insufficient to allow forceful contraction of the heart. The arteriocardillary bed dilates, perfusion of blood through the tissues practically ceases, and death is imminent.<sup>6,7</sup> In such states a real emergency exists. The intra-aortic pressure must be raised rapidly. Pressor drugs usually fail. Intravenous fluids are not effective. Blood poured into the venous circulation may simply overload the venous channels and cause further cardiac dilatation and pulmonary congestion. To reestablish blood flow the heart must resume effective pumping with adequate volume and force to bring about perfusion of blood throughout the body tissues. This may be accomplished by rapidly filling the arterial bed.

In states of severe hypotension blood injected into the arterial tree at a pressure higher than the arterial tension will flow along the line of least resistance. The entire arterial bed can be quickly filled. The blood flows directly into the coronary arteries, cerebral vessels and even into the left ventricle.<sup>7</sup> Herein lies the physiologic basis for intra-arterial transfusion. Usually a relatively small



amount of blood given intra-arterially is sufficient to raise the aortic pressure and cause more vigorous action. The heart soon regains its normal size and resiliency. The contractions are strong and regular. As the volume of blood is increased there is a progressive response and a steady rise in blood pressure. Furthermore, this improvement in circulation is usually maintained. Apparently, as the perfusion through the capillary bed is increased the pooled blood in the venous channels is recaptured and again becomes part of the circulating blood volume (figs. 3, 4).

We now feel that there are specific indications for the use of intra-arterial transfusion. In the laboratory one can easily demonstrate the exact stage of shock when intra-arterial transfusion is definitely needed. In clinical practice, one must depend somewhat more upon his judgment than upon tests. However, it is generally agreed that in following types of cases intra-arterial transfusion is indicated.<sup>8,9</sup>

1. Massive hemorrhage with acute circulatory failure.
2. Severe traumatic shock with peripheral circulatory collapse.
3. Prolonged moderate but progressive shock in which intravenous therapy has failed.
4. Shock in cardiac failure (coronary occlusion) where intravenous fluids are contraindicated.
5. Moderate to severe shock where only small lots of blood, or rare types, are available.

We feel that many lives can be saved if all hospitals are equipped and ready to use intra-arterial transfusion when the indication arises. It should not be considered a last resort or heroic measure. The supposed dangers and difficulties of giving blood by the arterial route has now been largely overcome. The technic can be made quite simple and safe.

The reaction of administering fluid intra-arterially is quite different from the intravenous route. Irritating drugs may be given intravenously with safety but may cause serious impairment of the peripheral blood flow if injected into an artery. The venous pressure is low and fluids may be given under very low pressure. The arterial route requires consideration of the initial arterial tension and also the rapid rise in pressure which usually follows the administration of any considerable volume of fluid. Furthermore, it must be remembered that when fluid is given arterially it may flow both toward the heart and to the periphery. Great care must be exer-

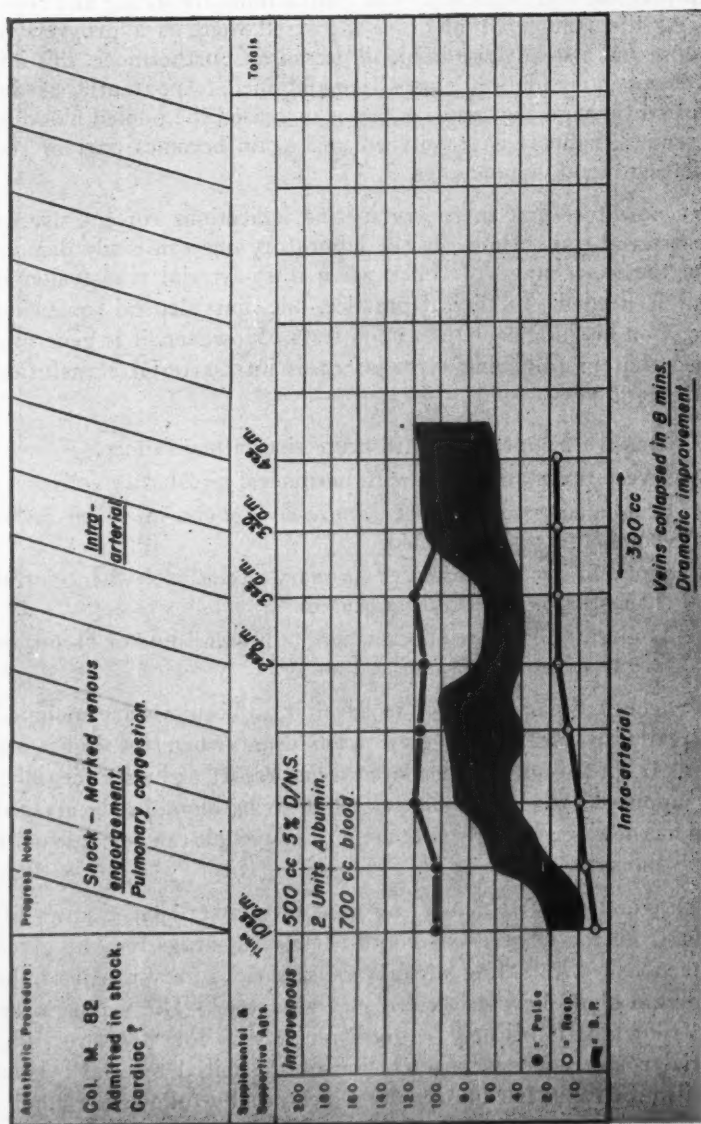


Fig. 4. Reaction of the peripheral circulation to intra-arterial transfusion in case of circulatory collapse in acute coronary occlusion.

cised to avoid overfilling the peripheral vascular bed as well as the heart.

The technical considerations of arterial infusion here presented will deal first with its mechanical aspects and second with complications associated with its performance.

Equipment used in arterial infusion has varied in complexity from a single syringe and needle to an elaborate apparatus with automatic controls. The need for quick and easy application of materials at hand has led us to adopt the standard intravenous blood transfusion sets. One type of factory produced expendable filtering transfusion set now in common use, when attached to an appropriate blood bottle, will provide a blood column  $160 \pm 15$  cm. in height. The static pressure thus produced at the needle tip has been found to be  $140 \pm 10$  mm. Hg. The effective pressure during free flow through such an apparatus would obviously be diminished. By rough measurement this decrement using a No. 18 gauge needle, is 10 mm. Hg. The significant inference from these facts is that such an apparatus will suffice in any case in which the major indications for arterial infusion are present.

The second mechanical consideration is the canulization of the vessel. This can be accomplished by direct transcutaneous puncture, by puncture of an exposed artery in a surgical wound, or by the "cut down" method. The "cut down" procedure will usually prove the most satisfactory. Only a simple surgical tray is needed and should always be available. The radial artery at the wrist is best suited for the following reasons: (a) It is usually large enough to admit an adequate size needle (No. 18 to 13 gauge); (b) it is easily accessible; (c) it is expendable in most cases. Local infiltration is satisfactory for patients not under general anesthesia, and even with general narcosis, may aid in diminishing arterial spasm. The artery can be readily exposed through a longitudinal incision just above the wrist. It should be mobilized and a ligature placed around it. If a needle is used, a direct puncture is made into the artery. For prolonged infusions a suitable canula should be inserted through a small incision and the artery then ligated. The skin incision should be closed until the canula is withdrawn, a firmly held compress will usually prevent bleeding and the ligature may be divided in the hope that the vessel will re-canulize.

The complications of arterial transfusion must be recognized, understood and prevented when possible before it can assume a proper place in therapy. While donor blood itself may cause the same general disturbances whether introduced through an artery or a vein, there are certain complications rather peculiar to arterial

transfusion itself. They may be local or general, and although most are easily explained, some are obscure, and even baffling in our present state of knowledge.

Infusions into the radial artery at the wrist may be attended by these local difficulties.

1. Damage to adjacent nerves, vessel and tissues.
2. Hemorrhage later from vessels sectioned but unnoticed at time of canulization.
3. Spasm of the radial trunk from trauma and infusate, thereby slowing the infusion rate, sometimes markedly.
4. Rupture of small vessels with hemorrhage into local tissue.
5. Thrombosis of finer vessels.

These complications are naturally decreased by practice and care for finer details.

Often disturbing is the degree of coldness and lividity of the extremity near the infusion site. Occasionally, there is ecchymosis of the surrounding tissues. Helpful measures to overcome these complications have been the discontinuation of the infusion for a minute or two, the injection of procaine or priscoline into the artery. For severe spasm an immediate sympathetic nerve block should be performed. All of these measures are designed to combat vasospasm, tissue hypoxia, secondary increased capillary fragility, and minor thromboses. It has been apparent that these complications have been more marked in very severe cases and in those which shock has lasted for a long period.

The general reactions include a greater possibility of air embolism particularly where high pressure is used in addition to gravity. Some of the obscure general complications suggest a series of questions, the answers to which would not only improve the management of arterial transfusion, but might well lead the way to more advanced forms of treatment. Most prominent is the question of the therapeutic end point. Apparently, an adequate systolic blood pressure has perhaps been too freely accepted as good evidence of efficient circulation. Even when coupled with observations of pulse pressure, tactile pulse volume, capillary refill time, skin color, temperature and skin moisture. It provides no assurance that the perfusion of the blood through the tissues and organs has been adequately re-established.

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## MESONEPHROMA OF THE OVARY

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**I**N 1939, Schiller<sup>6</sup> described a new type of ovarian neoplasm to which he gave the name mesonephroma. This neoplasm was characterized by cells of endothelial origin in the lining of cystic cavities, and specific structural units which duplicated the embryonic mesonephric glomerulus. The original discussion concerned 10 patients. In 1942, Schiller<sup>7</sup> again described 24 more neoplasms which he considered as belonging to this group.

### CASE REPORT

Mrs. F. L. S., a 56 year old white woman, came under our care in October 1951. She had noted abdominal pain and distention, associated with a marked weight loss.

In 1940, one year after the menopause, the patient noted vaginal bleeding which was treated elsewhere by deep roentgenotherapy. Vaginal spotting was treated by radium insertion in 1942. In 1950, profuse vaginal bleeding occurred and a dilatation and curettage was performed. Ten days prior to her admission, the patient developed intermittent vomiting and severe colicky pain in the right abdomen.

Upon admission, a scout roentgenogram of the abdomen revealed a partial small bowel obstruction. A skeletal survey and a chest roentgenogram were essentially negative.

Physical examination revealed an acutely ill white woman with signs of weight loss, malnutrition, anemia, and disturbance of fluid and electrolyte balance. The abdomen was markedly distended and a fluid wave was demonstrable. Pelvic examination revealed a large pelvic tumor extending up into the abdomen. The cervix appeared normal. The rectal examination was negative.

The patient was operated upon four days after her admission to the hospital, following restoration of fluid balance. An ovarian neoplasm was found filling the entire pelvis and the lower one-half of the abdomen. The tumor mass was semisolid and cystic, and had invaded directly into the right lateral pelvic wall and the peritoneal reflection of the bladder. Extensive peritoneal and omental metastases were present. The liver was singularly free. The small intestines were the site of multiple metastases involving the serosal surfaces, producing a small bowel obstruction in several places. A removal of the tumor for palliative purposes was done. The small intestine was then liberated at all of the obstructive points and the abdomen closed.

The postoperative course was uneventful until the twelfth postoperative day at which time the patient died of a massive pulmonary embolus.

The tumor was a firm pink mass measuring 10 x 9 x 4 cm. A thin capsule

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was perforated in many areas by tumor tissue. The cut surface varied from pink to white in color with scattered, small, yellowish areas of necrosis.

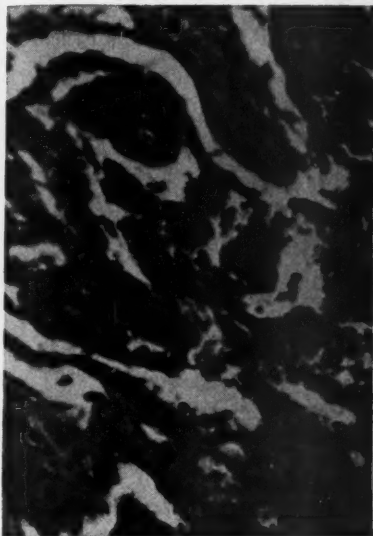


Fig. 1. Adenomatous and papillary pattern.

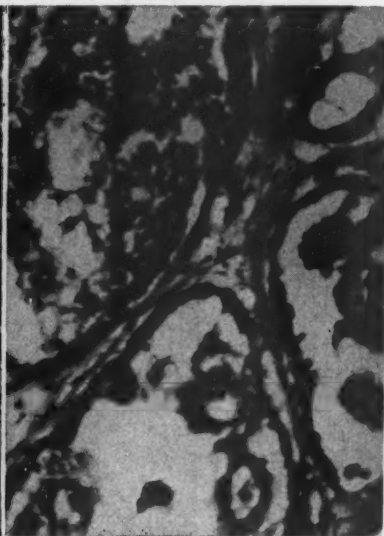


Fig. 2. High power showing lining cells of acini.

Microscopic examination revealed an adenomatous and papillary pattern (fig. 1). The cells lining the acini were cuboid with distinct nuclei (fig. 2). Many of the small cysts and acini showed papillary projections and tufts which resembled the embryonic glomeruli as described by Schiller (fig. 3).

**Pathologic Discussion.** Schiller<sup>6</sup> postulated development from a misplaced fetal remnant of the mesonephros. The abnormal inclusion of this remnant in the field of the ovary is understandable, as the mesonephros develops adjacent to the hilus of the ovary.<sup>7</sup> Kazancigil *et al.*<sup>5</sup> opposed the theory of Schiller, and suggested the term "papillo-endothelioma-ovary." They considered the microscopic feature as a whole and believed that these tumors were angio-endotheliomatous in origin. In two papers, Jones and Jones<sup>3,4</sup> have reported 15 similar tumors. These authors believed that the histogenesis is epithelial in origin rather than mesonephric. In 1943, Stromme and Traut<sup>8</sup> postulated that these tumors showed many of the characteristics of the pseudo-mucinous and serous cystadenomas of the ovary. Due to the fact that the tumors secreted mucus, they concluded that it would be better to regard this group as belonging to the teratoid cystadenomas. Teilum<sup>9</sup> in 1950, advanced the view that these tumors resulted from an overgrowth of the extraembry-

onic mesoblasts. Dockerty<sup>1</sup> states that the microscopic picture is as described by Schiller. He believes that variations do occur and that mucus production has been noted. The prognosis and treatment does not differ in any way from the other solid-cystic ovarian cancers.

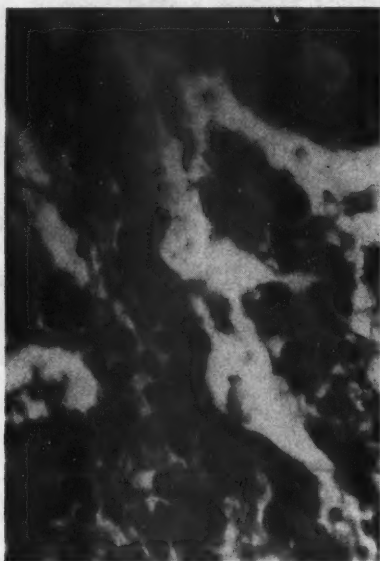


Fig. 3. High power demonstration of embryonic glomeruli.

*Clinical Characteristics.* This tumor is considered by most authors to be universally fatal. Symptoms occur due to the space occupied by the lesion itself.

The endometrium of the uterus is often found to be atrophic. This may be attributed to the fact that many of these patients have passed the menopausal period. However, a survey of age reports in the literature reveals no reliable basis for assuming that these tumors occur in any specific age group. Jensik and Falls<sup>2</sup> reported that these tumors have no specific hormonal activity and have showed a poor response to roentgenotherapy.

#### CONCLUSIONS

The histologic appearance of these tumors is distinctive and represents the tumor described by Schiller. There are no clinical characteristics or pathologic features which add or detract from the original hypothesis of mesonephric derivation.

These tumors should be considered malignant.

Their prognosis and treatment differs in no way from the general group of cystic-solid ovarian cancers.

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## RETICULUM CELL SARCOMA OF THE JEJUNUM\*

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**I**N reviewing the literature of the past 15 years, reports of only 5 patients with small intestinal reticulum cell sarcoma were found. Dinsmore and Ancona<sup>1</sup> reported such a tumor of the jejunum of a 58 year old woman in which the involved segment of small bowel was resected. The resected portion of mesentery showed spread of the tumor to the regional lymph nodes. One of the Cabot cases at the Massachusetts General Hospital<sup>2</sup> is recorded as a reticulum cell sarcoma of the terminal ileum. Carnes<sup>3</sup> has reported the third case, a reticulum cell sarcoma of the terminal ileum. Sugarbaker and Craver<sup>4</sup> list, but do not describe, two such tumors primary in the jejunum.

### CASE REPORT

G. B., a 56 year old white man, was seen in my office on Feb. 25, 1952, with a chief complaint of severe abdominal pain of four hours duration. About 10 a.m. there was a sudden onset of excruciating epigastric pain, constant in character and not relieved by food or changing body position. Neither nausea nor vomiting occurred.

Past history revealed the man had symptoms suggestive of a peptic ulcer 15 years previously and this impression was confirmed by roentgenologic findings of a duodenal ulcer at that time. However, he did not follow any standard treatment for this condition and, in fact, until five years prior to his present illness consumed one pint of whiskey daily. The remainder of his history and a careful system review was unrevealing.

Physical examination revealed a well developed, thin, middle-aged white man lying on his back with his knees drawn up and appearing acutely ill, covered with cold sweat and ashen-grey in color. Temperature was 100.2 F. by mouth. Positive findings were confined to his abdomen which was not distended and showed no surgical scars, but was exquisitely tender throughout and was board-like, making it impossible to palpate any organs. Even percussion produced severe generalized tenderness. Peristalsis was hyperactive in all quadrants. There was marked pain on percussion over the costovertebral angles. It was our impression that this man had a recently perforated duodenal ulcer with a gross and fulminating peritonitis. He was hospitalized immediately.

On admission, his leukocyte count was 14,200 per cu. mm. with 68 segs, 9 stabs, 1 juvenile, 17 lymphocytes, 3 monocytes and 2 eosinophils. The erythrocyte count was 4,620,000 per cu. mm. with hemoglobin 90 Gm. per 100 cc. and a hematocrit of 38. Nonprotein nitrogen was 46.5 mg. per 100 cc. A flat roentgenogram of the chest revealed no unusual features. Flat roentgenograms of the abdomen, erect and supine, showed a moderate amount of gas in the stomach and intestine. There was no free air under the diaphragm.

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Two hours after admission and under general anesthesia, a left paramedian incision extending from the costochondral junction to the level of the umbilicus served as an entry to the abdominal cavity. Intestinal contents and partly



Fig. 1. Tumor of jejunum (fixed gross specimen). Solid mass coated with hemorrhagic mucoid material. The mucosa is only eroded but not ulcerated. Cut surface shows the intestinal wall occupied by a grayish-white medullary mass.

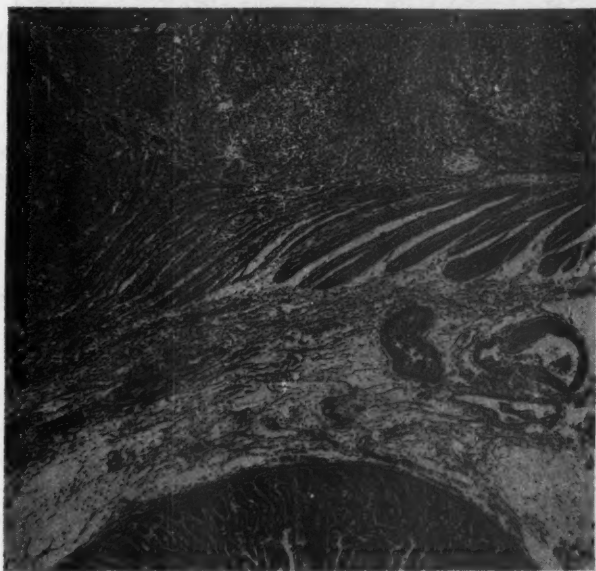


Fig. 2. Photomicrograph  $\times 36$  (Trichrome stain). The mucosa is free, submucosa shows some inflammatory and some tumor elements. The inner muscle layers are partly, the outer layers are completely occupied by tumor tissue.

digested food particles were found free in the abdomen but no perforation of the duodenum or stomach was discovered. About 10 inches distal to the ligament of Treitz, a tumor on the antimesenteric border of the jejunum was

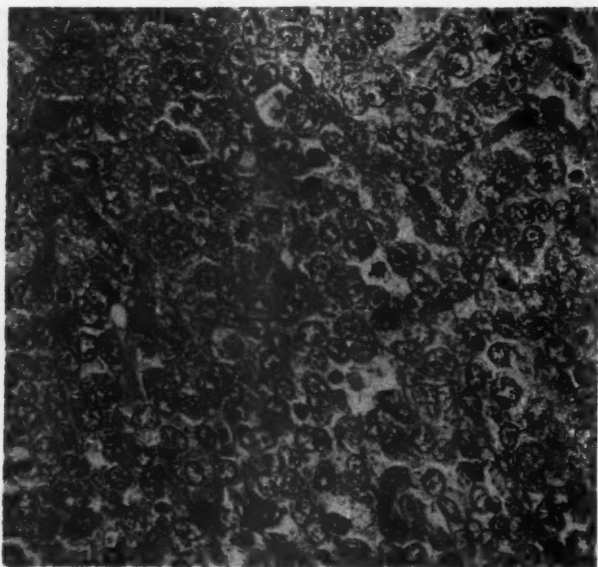


Fig. 3. Photomicrograph  $\times 455$  (iron hematoxylin stain). Rather closely packed tumor cells with large nuclei, large nucleoli and numerous mitoses.

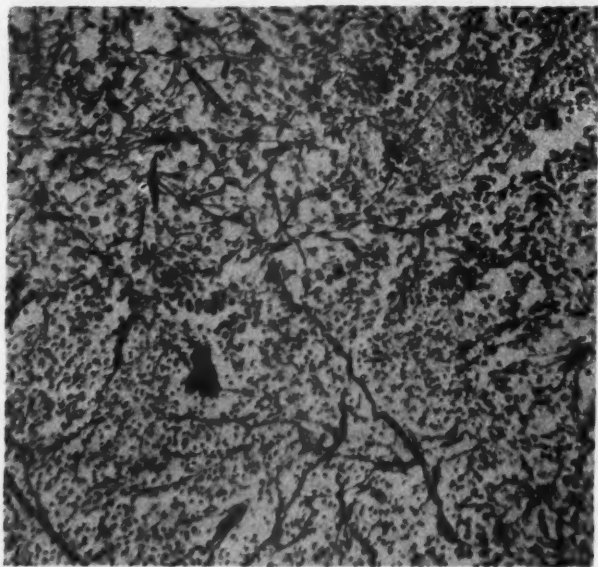


Fig. 4. Photomicrograph  $\times 160$  (silver stain). Numerous heavy and delicate argyrophilic fibers form a network around and between tumor cells (reticulo cell sarcoma).

observed. This tumor measured 6 by 3 cm., was covered with a purulent exudate; had ulcerated through the serosa; and in its center was a perforation measuring 2 mm. in diameter. Believing we were dealing with a malignancy, a section of jejunum measuring 36 cm. was resected (fig. 1) along with a corresponding wedge of mesentery and an end to end anastomosis, using a two layer technic, was accomplished. The postoperative course was uneventful and the patient was discharged on his eighth hospital day.

The tumor itself was composed of rather immature cells with numerous mitoses, large nuclei and large nucleoli and a tendency toward blastomatous giant cells (figs. 2, 3). The center of the tumor was necrotic. Silver stains revealed an impressive network of reticulum fibers (fig. 4). The findings were those of a fast growing reticulum cell sarcoma. The regional lymph nodes showed no invasion by tumor cells.

Four months after surgery, this man developed a complaint of difficulty in swallowing. Examination revealed a deviation of the trachea to the right and a distended network of veins over the left shoulder and the left arm. Roentgenologic examination of the chest showed a large mass in the superior mediastinum, extending from the first rib to and below the aortic arch and displacing the trachea and esophagus to the right. A gastrointestinal barium study at this time revealed no abnormalities.

#### SUMMARY

A case of reticulum cell sarcoma of the jejunum is presented. Its presence was first made known when it perforated. Indeed, the author's preoperative diagnosis was perforated duodenal ulcer. An extensive resection of the tumor-bearing bowel and the mesentery was performed. Despite the fact that the glands in the resected mesentery showed no invasion, this man developed a superior mediastinal tumor four months after surgery. Nevertheless, we do feel, along with Sugarbaker and Craver,<sup>6</sup> that for those cases showing a single area of involvement and which are accessible, radical surgical removal followed by external irradiation is the treatment of choice.

#### CONCLUSION

A case of reticulum cell sarcoma of the jejunum is presented. Apparently, this is the sixth case of reticulum cell sarcoma of the jejunum recorded.

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## PANCREATIC FISTULA FOLLOWING PARTIAL GASTRECTOMY: Report of a Case

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PANCREATITIS and pancreatic injuries have long been recognized as complications of gastric surgery. Since the seriousness and frequent occurrence of these sequelae are being brought to our attention more often in the current surgical literature, the report of a recent case with unusual pathology is indeed timely.

Warren<sup>1,2</sup> reported several cases of pancreatic complications following partial gastrectomy, a few of which progressed to an acute necrotizing pancreatitis and a fatal outcome. In these reports he described several procedures, utilized in the mobilization of the duodenum and of the ulcer, which were designed to prevent these injuries and to treat the complications if they occurred. He states that the degree of pancreatic affection is unpredictable; for routine procedure on normal anatomic structures may result in fulminating illness, whereas, gross contusion, laceration, or other major trauma may be followed by a benign postoperative course. The experiments of Popper and Nechelis<sup>3</sup> on dogs may explain this phenomenon. They found that pancreatic secretion is inhibited after severe injuries to the pancreas or after major surgery on the pancreas. This resistance to stimulation permits an efficient sealing off of the pancreatic wound.

Injuries to the ducts of Santorini and Wirsung are said to produce the most serious complications. Although the duct of Santorini is considered to be more superficial and more easily traumatized than the duct of Wirsung, Cattell<sup>4</sup> states that the duct of Wirsung is also superficial and easily palpable in obstruction. Millbourn<sup>5</sup> has found that the duct of Wirsung is the main or sole pancreatic duct in 90 per cent of cases. Therefore, injury to this duct is serious.

The postmortem findings in the patient to be reported revealed the duct of Wirsung was the only duct present.

### REPORT OF A CASE

A 28-year-old white male baker presented himself to the hospital with the

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history of epigastric pain of five years' duration. The pain had radiated to his back frequently, and it was relieved occasionally by diet. The patient had repeated episodes of nausea and vomiting, without hematemesis or melena. The symptoms became severe in January 1951 and he was admitted to the hospital at that time. A diagnosis of pyloric obstruction was made, and this was treated conservatively. He improved and left the hospital within the usual recovery time. However, the original symptoms recurred within a few months, and he was readmitted to the hospital on June 26, 1951.

Physical examination showed nothing peculiar except moderate epigastric tenderness. The laboratory findings, including a serum amylase determination, were within normal limits. Two gastrointestinal series revealed a partial pyloric obstruction, without actual visualization of the ulcer crater.

After admission to the hospital the patient was treated conservatively for two and one-half weeks. This included relieving the obstruction and preparation for surgery. At operation an ulcer, 3 by 3 cm. in size, on the posterior surface of the first portion of the duodenum was found to be penetrating the pancreas. The duodenum was opened to facilitate its dissection from the pancreas. The base of the ulcer was so firmly adherent to the pancreas that it was necessary to cut the duodenum from the ulcer base and leave the latter attached to the pancreas. A partial gastrectomy was performed using a Hofmeister type posterior anastomosis.

The first postoperative day was uneventful except for a temperature elevation to 102 F. Peristalsis was present, and the material removed via the Levine tube contained bile. His temperature remained elevated, but physical examination revealed no apparent etiology. On the third postoperative day, after removal of the Levine tube, the patient's abdomen became distended. This distention was not gaseous. At this time a serum amylase determination was 640 units. The distention progressed, and within a few days it was obvious that ascites was present. On the tenth day paracentesis yielded 6,700 cc. of cloudy straw-colored fluid with an amylase value of 1743 units. There was no bile in the fluid.

The patient was treated with fluid and electrolytic replacement. This included whole blood transfusions and intravenous fluids containing protein and potassium. After several paracentesis which yielded large quantities of fluid, an adhesive peritonitis developed that pocketed the accumulating material. At this time an open drainage of the pancreatic area was done under local anesthesia. The drainage tube was connected to a bedside bottle, and as much as 2400 cc. was collected over 24 hour periods. He was given total intravenous feedings and various medications to decrease the amount of drainage. This was unsuccessful. He was then given supplemental protein concentrate by mouth, pancreatin and other preparations, but he progressively lost weight. The electrolytic pattern was fairly well maintained, but the protein level fell to 4 Gm. His stools remained normal, and the amylase value of the gastric contents was 1,984 units. This suggested that a portion of the external secretion of the pancreas was reaching the gastrointestinal tract.

A jejunostomy was performed with the hope of improving his general condition enough to withstand a more extensive operative procedure. Large quantities of protein concentrate were administered in this manner, but his condition failed to improve. At the time of jejunostomy extensive peritoneal and retroperitoneal fat necrosis was evident. All heroic measures to correct the nutritional state failed, and the patient died on the seventy-ninth postoperative day.

Autopsy was limited to the abdomen. There were fibrinous adhesions throughout. Practically no fat remained in the mesentery. The anastomosis and duodenal stump were well healed. A large ulcer crater was noted on the surface of the head of the pancreas. Dissection of the pancreas revealed the presence of only one large duct; the accessory duct was absent. The main duct not only was found to enter the ulcer on the surface of the pancreas but was also eroded (fig. 1). This duct continued into the second portion of the duodenum slightly superior to the ampulla of Vater. A fistulous tract extended from the ulcer externally to the abdominal wall.

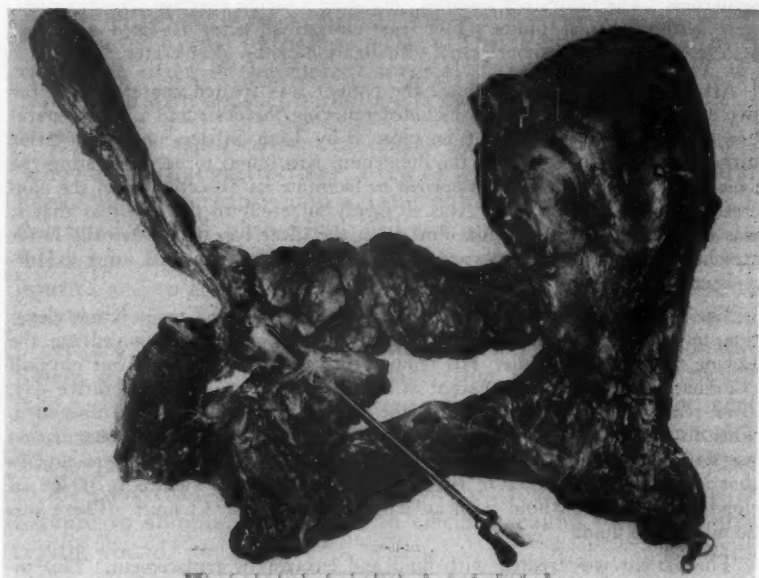


Fig. 1. The stomach and anastomosis can be seen on the right and the gallbladder on the left. The duodenal stump, seen inferior to the gallbladder on the left, has been opened. The probe is through the external fistula, and the arrow points to the open pancreatic duct in the base of the ulcer.

Microscopic sections through the base of the ulcer showed a part of the duodenum in which one area presented no mucosa, and another, fibrosis of the submucosa.

Many mononuclear cells were seen in one area. The fibrosis extended into the pancreatic tissue. The erosion of the pancreatic duct was thought to be identified microscopically; however, cells lining the duct were not present.

*Comment.* During the stormy postoperative period it was feared that the major pancreatic duct had been inadvertently lacerated at the time of the partial gastrectomy. However, on postmortem examination an erosion of the duct of Wirsung by the base of the ulcer was found. This erosion was not discovered at the time of surgery.

Pancreatic tissue frequently forms a portion of the base of a peptic ulcer, and penetration of the pancreas with localized pancreatitis is frequently a complication. This involvement of the pancreas is usually considered to be superficial. Pancreatic duct erosion with a resultant internal pancreaticoduodenal fistula is, however, not common. Crile and Jaffe<sup>6</sup> reported a case of duodenal ulceration caused by erosion of a pancreatic calculus, which resulted in a pancreaticoduodenal fistula and was further complicated by severe gastrointestinal bleeding. Fanger<sup>7</sup> reported a similar case. These cases were not true peptic ulcerations, for they were considered to be secondary to the calculi. Bohmansson<sup>8</sup> stated that he had seen erosion of the pancreatic duct in the base of the ulcer at the time of operation.

On the basis of postmortem findings the case reported at this time may have had an internal pancreaticoduodenal fistula prior to surgical intervention. This was converted into a pancreatic fistula which opened into the peritoneal cavity at the time the duodenum was resected from the base of the ulcer.

#### SUMMARY

A case of pancreatic fistula following partial gastrectomy for duodenal ulcer is reported. The ulcer had penetrated the pancreas and eroded the duct of Wirsung. This created an internal pancreaticoduodenal fistula which was probably present prior to surgery. Reference to the pertinent current literature is made.

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## THE SUPERIORITY OF ALLOY STEEL SUTURES IN CLOSURE OF ABDOMINAL WOUNDS

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**I**NCREASING emphasis is being given by the thoughtful surgeon to the choice of suture material in special situations encountered in surgery. The dependability of surgical suture material should be the fundamental knowledge of every surgeon. The requirements of an ideal suture material<sup>1</sup> have been clearly and repeatedly set forth, that is: (1) the suture should hold the wound edges together until the wound is healed, (2) the suture should not be affected by or take part in any untoward reaction during healing, (3) the suture should be absorbed or become innocuous after the wound is healed. The cardinal factor in the choice of the suture material should be the response of tissues to the suture material.

Of the many factors influencing the healing of surgical wounds, the reaction accompanying the use of different suture materials has been studied most extensively. Preston<sup>2</sup> demonstrated that wounds closed with steel wire had the least local reaction to this suture material and the greatest tensile strength. Bell<sup>3</sup> found that steel was particularly well tolerated for long periods of time, even in infected wounds, and better wound healing was obtained using steel. Dean<sup>4</sup> found that wire sutures maintained a passive role and interfere in no way in secondary wound healing in the presence of wound complications, such as infection, hemorrhage or necrosis.

Large<sup>5</sup> found reaction of tissues to various sutures is influenced by several factors: (1) the number and type of organisms present at the time of suturing, (2) the vascularity of tissues, (3) the general nutrition, (4) foreign bodies other than sutures. These local and systemic factors are too often believed to be the cause of wound infection and disruption when the choice of the suture material and the reaction to that material and the technic used are at fault. It has been repeatedly demonstrated that catgut produces the greatest irritation in wounds, plain more so than chromic. Silk and cotton produce irritation to a lesser degree than catgut, but far more than alloy steel wire. Wounds with the greatest irritation heal the slowest and have the least tensile strength. Nonirritating sutures of alloy steel produce minimal tissue reaction, wound healing is not retarded and the wounds have greater tensile strength. In infected wounds catgut and silk produce even greater tissue reactivity. Cat-

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gut dissolves in the presence of pus. Mu and Pai<sup>6</sup> found that infection penetrated the filaments of silk or cotton sutures and formed a nidus for the infecting organism and infection persisted until the sutures had been discharged. Because steel is a single filament and nonpermeable, a nidus of infection can not be formed and healing occurs even in the presence of pus.

Metal sutures have been used for centuries in surgery. The Greeks used ligatures of gold. Various materials were tested in the first part of the nineteenth century in this country. The work of Sims repairing vesicovaginal fistulas with sutures of silver wire 100 years ago is well known. In 1934 Babcock<sup>7</sup> introduced the use of fine alloy steel wire as a permanent suture material because of its fine caliber, smooth surface, nonpermeability and chemically stable nature. Preston<sup>8</sup> has demonstrated that alloy steel wire sutures have greater tensile strength and holding strength of knots than catgut or silk.

There is much to substantiate the theory that alloy steel wire is a superior suture material. It is realized that most clean laparotomy wounds have been and will probably continue to be closed successfully with silk, cotton or catgut. It is not advocated that alloy steel wire closure of the abdomen be a routine procedure, but that it is indicated particularly in certain conditions arising in abdominal surgery. When actual or potential wound infection exists, when disruption is feared, in advanced age, in carcinomatosis, cachexia, and operations upon the biliary tracts, in the presence of jaundice, and where there is drainage of biliary, pancreatic or other digestive ferments, better healing can be obtained with alloy steel wire closure of the wound. The problem of disruption is one of the main reasons for choosing alloy steel as the suture. Able and Hunt<sup>9</sup> state that disruption is due to one or more of these causes: (1) failure of the biological processes of wound healing, (2) interference with healing or the dissolution of recently healed tissues by a local infection or by digestive enzymes, (3) a disruption force such as vomiting, coughing or abdominal distention. The incidence of wound disruption for any consecutive series of abdominal operations reported in the literature is from 1 to 3 per cent with a 20 to 50 per cent mortality.

In this clinic alloy steel wire has been selected routinely as the suture in closure of abdominal wounds arising under the above condition. The technic was described by Jones and Newell<sup>10</sup> in 1941. A so-called Smead stitch is employed which is a figure-of-eight suture passing through the anterior fascia, muscle, posterior fascia and peritoneum and again through the anterior

fascia in the same direction. After  $\frac{3}{4}$  of the wound is closed the remaining  $\frac{1}{4}$  is loaded with the first part of the interrupted stitch. Each stitch is then completed in turn. The wire ends are cut flush with the jaws of a hemostat, which is clamped snugly against the knot. The hemostat is then rotated 180 degrees turning the ends downward. A smooth knot is thus presented to the subcutaneous tissues in which no sutures are placed. No retention sutures are used. The skin is closed with interrupted wire sutures. Certain technical details in the handling of the suture must be adhered to: (1) the proper amount of tension must be exerted in tying the suture to approximate but not constrict the tissues, (2) the knot must be squared, (3) the ends of the wire must be turned down carefully, (4) kinking must be avoided since the wire will break at this point. The newer multi-strand suture material has largely prevented kinking.

## OPERATIONS 1949 TO 1952

*Alloy Steel Wire Closure*

Gastric resection .....	9
Combined abdominal perineal resection.....	6
Gastroenterostomy (carcinomatosis) .....	2
Resection of small bowel.....	1
Colostomy .....	4
Ileotransverse colostomy .....	1
Resection of colon.....	4
Crushing abdominal injury and hemorrhage.....	1
Intestinal obstruction .....	7
Hysterectomy and peritonitis .....	3
Stab wound of abdomen .....	2
Secondary wound closure .....	5
Gun shot wound of abdomen.....	2
Volvulus .....	1
Ruptured kidney .....	1
Obstructive jaundice and cholecystectomy.....	4
Pancreatitis .....	2

In this clinic from the year 1949 to 1952 there were 55 cases in which the above method was selected to close the wounds. The accompanying table indicates the variety of conditions in which this method was used. All wounds healed by primary intention despite accompanying adverse conditions. There was no case of wound disruption and no postoperative hernias have been observed. When there had been occasion to perform a second stage procedure in some of these cases one was impressed by the minimal adhesions at the site of the previous wound.

None of the unfavorable results attributed to the use of alloy

steel wire sutures have been experienced. It has not been necessary to remove a suture because of discomfort to the patient, although this has been reported occasionally when weight loss has been rapid following an operation. It is a simple procedure to remove the offending suture under local anesthesia.

#### SUMMARY

1. The advantages of alloy steel wire sutures have been discussed.

2. The method of closure of abdominal wounds by Jones and Newell utilizing alloy steel wire sutures is again presented.

3. The types of cases of abdominal operations in which alloy steel wire sutures have been employed in this clinic for the past three years have been listed.

4. The use of such suture material produces wounds of greater tensile strength than by other conventional methods even under unfavorable conditions, and virtually prevents wound disruption.

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## CALCIFIC DISEASE OF THE GALLBLADDER

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**C**ALCIFIC, or calciferous, disease of the gallbladder occurs in varied forms. The following simple classification is adequate for the clinical consideration of the problem:

1. Calcium stones.
  - a. Pure calcium salt stones.
  - b. Calcium salt deposits on or incorporated in mixed type stones.
2. Calcification of the gallbladder wall.
  - a. Intrinsic.
  - b. Extrinsic.
3. Milk of calcium bile.
4. Combinations of the above types.

Although stones composed purely, or even largely, of calcium salts are very rare and are usually associated with milk of calcium bile, mixed type stones with sufficient calcium content to render them radiopaque are rather common in occurrence.

Calcification of the gallbladder wall is of two types, designated as "intrinsic" or "extrinsic" depending upon the source of the calcium deposits within the wall. The term "porcelain gallbladder" has been applied to all types of calcific disease of the viscus but more correctly it is restricted to those rare cases exhibiting rather extensive calcification of the gallbladder wall. The term "milk of calcium bile" is the generally accepted, though inept, term used to describe a collection of calcium carbonate crystals as a putty-like, plastic mass within the lumen of the gallbladder. This report is largely concerned with this particular form of calcific disease.

Although Allison reported "Ossification of the Gallbladder" in the London Medical Gazette in 1845 and several reports of calcification of the gallbladder wall appeared in the last half of the nineteenth century, it was not until 1911 when Churchman's famous report appeared that any case was published which could be interpreted as being milk of calcium bile. Noting that the putty-like material within the lumen of the gallbladder had a slight saponifying property, Churchman called it "calcium soap" and through rather

inexpert chemical analysis attempted to prove that this material was truly a soap. This peculiar quality of the contents of the gallbladder, in this case, might have been attributed to a considerable quantity of bile acids and cholestrin mixed with the calcium carbonate. In 1926, Volkmann reported 2 cases, only 1 of which was operated upon. He used the term "lime milk bile."

Five years later, Phemister's famous report appeared in the *Annals of Surgery* and established the disease entity. By 1933, Knutson was able to report 12 cases, all of which had been operated upon. Henry Walter reviewed the world literature in 1937 and was able to collect a total of 38 case reports but Cameron further analyzed these reports and discredited all but 22 cases. In the last 15 years sporadic reports have appeared and, notwithstanding the fact that large series of cases have not been reported, the disease is probably less rare than the textbooks would lead us to believe.

The cases reported herein are from the surgical services of the St. Joseph's Infirmary, Atlanta and Emory University Hospital, Emory University, Georgia.

#### CASE REPORTS

CASE 1. Miss C. W., a 48 year old schoolteacher, had consulted a urologist because of urinary frequency. In the course of the urological investigation, a radiopaque stone was discovered in the region of the cystic duct and the gall-

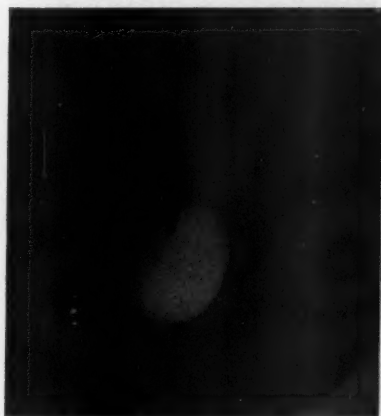


Fig. 1, Case 1. Roentgenogram exhibiting a collection of milk of calcium bile in the fundus together with an opaque stone in the cystic duct region.



Fig. 2, Case 2. Note the crescentic opacity in the gallbladder region which was interpreted by the roentgenologist to be calcification of the gallbladder wall.

bladder appeared to be filled with milk of calcium bile. The patient denied symptoms of biliary disease. She was admitted to the hospital and cholecystec-

tomy was performed. The gallbladder was doughy in consistency. Aspiration produced a small amount of pale yellow mucoid bile which contained white flocculent material. A stone 0.8 cm. in diameter was impacted in the cystic duct. After removal of the gallbladder the liquid content of the viscus could not be expelled by squeezing the fundus. The wall was of normal thickness. The lumen contained about 20 cc. of thick, white, tenacious, putty-like material. The stone in the common duct was of the pigment type coated with calcium salts. On microscopic section, the gallbladder wall appeared to be normal except for slight thickening of the muscularis.

**CASE 2.** Mrs. H. S., a 56 year old housewife, was admitted to the hospital with symptoms of acute cholecystitis. She had had recurrent attacks for the preceding 20 months. These attacks seemed to be initiated by ingestion of "rich food." Roentgenogram disclosed a crescentic opacity in the gallbladder region which the roentgenologist interpreted as calcification of the gallbladder wall. At operation, the gallbladder was found to be acutely inflamed with early gangrene of the fundus. It was necessarily removed in retrograde fashion and although no stone was felt, the surgeon was of the opinion that a small stone could possibly have been present beyond the point of transection and rendered impalpable by the unusually severe inflammatory change in that region. The lumen contained some light yellow, mucopurulent material and about 3 cc. of soft, white, tenacious paste adherent to the mucosa in the fundal region but which could be scraped off with ease. Microscopic examination of sections of the gallbladder wall revealed severe acute inflammation.

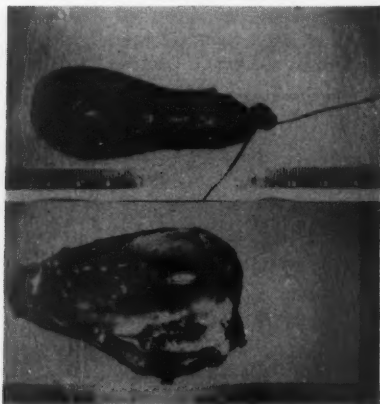


Fig. 3, Case 2-a. The gallbladder was acutely inflamed and (b) contained, in addition to mucopurulent exudate, a small amount of milk of calcium bile accounting for the crescentic shadow seen on roentgenogram. (See fig. 2.)



Fig. 4, Case 3. Note the low-lying gallbladder exhibiting poor concentration of dye and containing several calcified stones. The overlying shadow of the ilium probably obscured the pool of milk of calcium bile found at operation.

**CASE 3.** Mrs. L. S., a 63 year old widow, had for the previous five years suffered postprandial pain which radiated to the right scapular area. She complained of an intolerance to fatty foods. An attack of acute cholecystitis two years prior to admission had been treated by cholecystostomy. A subse-

quent acute attack occurred about three months prior to admission. On examination, moderate tenderness in the right hypochondrium was noted. An old operative scar was present in the right upper quadrant of the abdominal wall. Plain roentgenogram of the abdomen revealed a low-lying gallbladder with several calcium coated stones. After the administration of 12 tablets of Priodax, there was only slight concentration of the dye. At operation, dense adhesions were noted around the gallbladder which had a markedly thickened wall. Stones were palpated in the ampulla but no stone could be said to be impacted within the cystic duct. After removal of the viscus, however, the liquid content of the lumen could not be expelled by squeezing the fundus. The lumen contained a little pale yellow bile, numerous faceted mixed-type stones, and about 5 cc. of pale yellow putty-like paste. Microscopically evidence of severe inflammation was noted.

CASE 4. Mr. R. E., a 59 year old business man, was admitted to the hospital with left ureteral colic. He had had several previous attacks of colic, both right and left, and had passed at least four stones. Roentgenogram revealed an opacity of the gallbladder in addition to a calculus in the left ureter. After recovery from surgery for the urinary calculus, cholecystectomy was performed. The gallbladder was densely adherent to surrounding structures. The surgeon made no mention of a stone or other obstruction of the cystic duct. The lumen contained green bile and several small white stones imbedded in a mass of granular, tenacious, white paste. On microscopic section, marked hypertrophy of the muscularis was noted which was interpreted to be evidence of resistance to the evacuation of the viscus. The usual evidence of chronic inflammation was present.



Fig. 5, Case 4. Opacity in the gallbladder region seen on roentgenogram.



Fig. 6, Case 5. Roentgenologic findings. Note the contracted gallbladder filled with milk of calcium bile and the large calcified stone in the region of the cystic duct.

CASE 5. Mrs. L. G., a 28 year old housewife, was admitted to the hospital because of intermittent attacks of abdominal pain accompanied by nausea and vomiting. These attacks had begun about five years previously and recurred at

two to six weeks intervals. They did not appear to be related to the ingestion of food. Examination revealed slight tenderness in the region of the gallbladder. Roentgenogram revealed an opaque stone in the region of the cystic duct and a contracted gallbladder filled with opaque material. At operation, the gall-

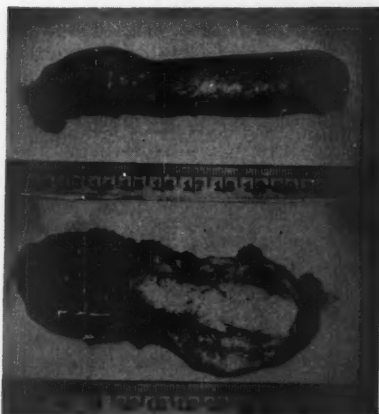


Fig. 7, Case 5-a. Note the marked concentration of the gallbladder. b. The semi-solid mass of milk of calcium bile filling the lumen maintained its shape without the support of the gallbladder wall.



Fig. 8. The roentgenogram of the gallbladder in this patient is rather typical of calcification of the gallbladder wall but at operation a single large stone was found to fill the gallbladder and no calcification of the wall could be demonstrated. (Case report not included.)

bladder, on palpation, appeared to be filled with a single large stone. A smaller stone was impacted in the cystic duct. When opened, the lumen was found to be filled with thick, tenacious, yellowish-white, putty-like material with at least two formed calculi of pure calcium salt composition embedded in the mass. The cystic duct stone was composed of pigment with coatings of cholestrin and calcium salts. On microscopic section, severe chronic inflammatory change was noted with mild fibrosis of the muscular coat.

### DISCUSSION

The theory that calcium precipitated within the lumen of the gallbladder, is derived from the secretion of the gallbladder mucosa, is untenable in the light of the fact that calcium concentration in hydropic bile is less than that of normal bile. This theory is further refuted by the work of Mirvish who demonstrated that calcium may actually be absorbed into the blood stream by the mucosa. The calcium salts must necessarily be derived from the bile itself. This precludes the possibility of complete obstruction of the cystic duct. The fact that green or yellow bile is usually found at operation within the lumen, together with the precipitated lime, further substantiates this conclusion.

The bile, having entered the lumen of the gallbladder with its burden of approximately 20 mg. per cent of calcium in solution, is, through some alteration of the normal physiology, persuaded to part with a portion of its calcium content through precipitation. The normal calcium content of the blood is about 10 mg. per cent. The concentration in the liver bile, which is about twice as great, approaches saturation. In the supersaturated state produced by dehydration of the bile within the gallbladder, solubility is maintained by two factors: 1) It has been shown that concentrations of cholesterol and bile salts in bile tend to maintain calcium salts in solution. 2) The decreased alkalinity of gallbladder bile increases the solubility of calcium salts. This change in hydrogen ion concentration (from about pH 8.2 in liver bile to about pH 5.8 in the gallbladder bile) is probably impaired when the gallbladder mucosa is damaged by infection or other disease, and, as the bile is concentrated in the gallbladder, precipitation of calcium carbonate could result. In a similar manner, damage to the mucosa might alter its selective absorptive function resulting in a lowering of the bile salt content which would also favor precipitation. Regardless of the mechanism of the precipitation, it would seem that the precipitum would be flushed out of a normally contracting and emptying gallbladder.

It has been shown that in addition to disease of the gallbladder, which promotes precipitation of calcium carbonate, an obstruction, either intermittent or valve-like, of the cystic duct permitting the entrance but hampering the exit of the bile is necessary to produce the clinical entity of milk of calcium bile. More recent knowledge bears out the theory advanced by Knutsson nearly 20 years ago when he proposed "long-delayed emptying or entirely inhibited emptying of the gallbladder in conjunction with inflammatory changes in the gallbladder wall" to be necessary conditions for the production of limy bile.

Calcification of the gallbladder wall apparently is of two types: intrinsic and extrinsic, each produced by a different mechanism. Calcium carbonate inclusions incorporated within the gallbladder wall through healing over of ulcerations on which calcium salt has been deposited, are usually localized. This phenomenon may follow ulceration due to malignancy, inflammation or pressure necrosis. The calcium carbonate-phosphate deposits within the intact gallbladder wall may be more extensive and represent degenerative change just as degenerative calcification occurs in other viscera.

#### TREATMENT

Though calcific disease of the gallbladder may be asymptomatic

just as ordinary gallstones may be "silent," it is frequently associated with symptoms and not infrequently associated with attacks of acute cholecystitis. The more than casual relationship with primary malignancy of the gallbladder constitutes another important reason for removing the gallbladder in these patients. Therefore, cholecystectomy is indicated in calcific disease of the gallbladder for some of the same reasons that it is indicated in ordinary cholelithiasis.

#### SUMMARY

1. Calcific disease of the gallbladder takes various forms: calcium salt stones, either pure or of mixed type; calcification of the gallbladder wall; and, the rather rare and interesting phenomenon, milk of calcium bile.

2. Five new cases of milk of calcium bile are briefly described.

3. In a discussion of the mechanism of the precipitation and retention of calcium carbonate within the gallbladder, emphasis is placed upon the necessity for the coexistence of damaged gallbladder mucosa and intermittent, or valve-like, obstruction of the cystic duct.

4. The treatment is cholecystectomy.

The authors wish to express their appreciation for the courtesy of Drs. Marvin Mitchell and Duncan Shepard in permitting the use of clinical material.

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## THE SURGICAL IMPLICATIONS OF MYOEPIITHELIAL HAMARTOMA (of Clark)

With Report of An Illustrative Case

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**W**ITHIN recent years there have been an increasing number of reports of epithelial cysts, with and without pancreatic tissue included, located in the stomach, duodenum, and intestinal tract. Some have been found in the biliary tree. The general location of these lesions has been as unpredictable as their size and their tendency to produce symptoms. Observers have varied in their conclusions as to the nature, origin, and importance of these lesions. Some recent observers<sup>1</sup> believed that they were benign, could be diagnosed roentgenographically in the duodenum and did not necessarily merit removal. Other observers<sup>2</sup> have taken the opposite point of view, that these lesions demand urgent and definitive surgical treatment.

It is the purpose of this paper to report an additional case of a patient who had such a tumor and to offer further discussion as to its origin, and possible implications.

### CASE REPORT

The patient was a 29 year old married man who was admitted to the Seattle Veterans Administration Hospital on January 8, 1952. For the past five years he had experienced intermittent belching, and "heart burn," with some epigastric pain radiating from the left to the right across the abdomen. There had been no nausea or vomiting, no hematemesis and no abnormalities of the stools. These symptoms had become increasingly severe and his recent examination was precipitated by a 10 pound weight loss in the past six months. He had had repeated gastrointestinal examinations in various military hospitals, but nothing was found. At the insistence of his family physician, another gastrointestinal series was done in December 1951. A filling defect was found in the prepyloric region of the lesser curvature.

The patient was a tall, wiry, healthy-appearing young man in no distress. The vital signs were normal. He showed little evidence of weight loss. His skin was clear and his heart and lungs were normal. The abdomen was soft with slight tenderness in the epigastrium. There was some involuntary splinting of the right rectus muscle. There were no palpable masses. Rectal exami-

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nation was negative. There were small non-tender nodes in the axillae and the inguinal regions. No supraclavicular nodes were felt.

Laboratory examination revealed a hemoglobin of 16 Gm. per cent; hematocrit 51 per cent; bleeding time 1 minute, 35 seconds; coagulation time 5 minutes, 30 seconds; leukocytes 8,100 per cu. mm. Urinalysis was normal. The Kahn test was negative. Gastric analysis revealed no free hydrochloric acid, even after histamine stimulation. The secretin amylase curve was normal.

An upper gastrointestinal roentgenologic examination was made showing a normal esophagus and stomach except in the antral region where there was a filling defect of about 1 cm. in diameter in the midportion of the antrum. The rugal folds on both sides of this defect appeared to be normal. There was no obstruction of the flow of barium from the stomach (fig. 1). Roentgenograms of the duodenal curve were normal. Roentgenogram of the chest was negative.



Fig. 1. Roentgenogram of the patient taken preoperatively. Note the filling defect in the mid-prepyloric region.

On January 17 an exploratory laparotomy was done, revealing a 1 by 1 by .6 cm. smooth submucosal mass about 2 cm. proximal to the pylorus (fig. 2). This was freely movable and not pedunculated. It was difficult to understand how this could give a polypoid appearance on the roentgenogram. At the time of operation it was thought that this was a benign leiomyoma. Accordingly a section of the pyloric antrum measuring about 7 cm. in length on the greater and  $4\frac{1}{2}$  cm. on the lesser curvatures was removed, including the pyloric valve. A gastroduodenostomy was performed with closure of the lesser curvature of the stomach.

Postoperative course was complicated by some vomiting on the eighth postoperative day, but this subsided and the patient was discharged on his fifteenth postoperative day. He was eating three meals a day and was asymptomatic. He has continued to be asymptomatic at the time of this writing, six months postoperative.

The report of the pathologist on examination of the specimen confirmed its relationship to the pyloric valve. On section it was a yellowish submucosal nodule attached to the muscularis. It was thin-walled, multilocular and cystic



Fig. 2. The submucosal mass was located in the upper portion of the prepyloric area of the stomach. The scale is directly over the pyloric valve. Distortion of the gastric rugae is apparent. (X  $1\frac{1}{2}$ )

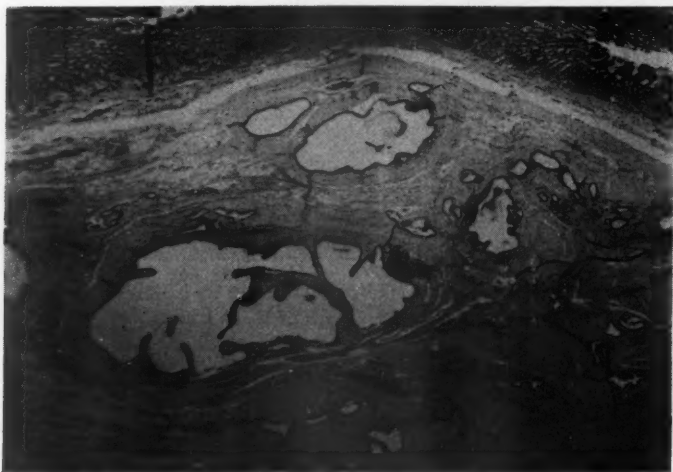


Fig. 3. Photomicrograph of a cross section of the cystic tumor showing multiple loculations. There is definite demarcation from the mucosa, but intimate attachment to the muscularis. This is a characteristic of these lesions. (X 52)

in the center. The largest cyst measured .4 cm. in diameter. Microsections showed the mass to be lying definitely within the submucosa and separated from the overlying mucous membrane by an intact muscularis mucosa and a zone of areolar fibrous connective tissue. It was fairly well delimited from the subjacent muscularis, except at one point where the glandular tissue of

the mass dipped into the adjacent muscle. The mass itself was composed of irregular mucous glands, which had the appearance of ducts. Glandular acini were very common and varied in size, some forming cysts which were seen

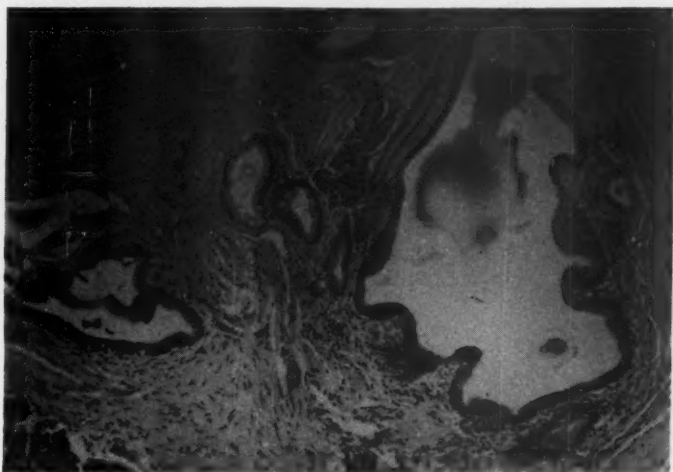


Fig. 4. A higher power magnification of a small cyst and the acinar tissue from the corner of a larger cyst. The epithelial lining of the cysts is indistinguishable from that lining the biliary tract. The acinar tissue (in the lower left hand corner) is definitely serous in type. (X 100)

grossly (fig. 3). Two small islands of glandular acini consisting of cells of the serous variety, such as are seen in salivary or pancreatic glands, lay in intimate association with the ductal epithelium and were lined by tall columnar cells (fig. 4). No recognizable pancreatic islet tissue was seen. There was no ulceration.

#### DISCUSSION

The finding of small tumors containing various types of epithelium and muscle in the wall of the stomach, duodenum, intestinal tract and biliary tree is relatively uncommon. It was first described in 1859 in the German literature.<sup>3</sup> One author believed that it occurred frequently and reported the finding in 10 of 1800 autopsy examinations. Up to 1934, 186 such cases had been reported in the literature.<sup>3</sup> The distribution of these tumors is fairly consistent. About one third are found in the stomach, one third in the jejunum and ileum, and the remainder in the duodenum and biliary tree.<sup>3,4</sup> About 95 per cent are in the wall of the viscus involved and are either in the muscularis or subserosa.

The tumor found in this particular patient could not conclusively be called pancreatic in type. However, the three general types of epithelium and the pattern of the surrounding musculature put the

lesion definitely into that category of tumors termed "myoepithelial hamartoma" described by Clarke.<sup>4</sup> The origin of these growths is debated by all who have written about them. Four general theories are presented by several authors:

1. The tumors arise from pancreatic buds that become adherent to adjacent organs during fetal life.
2. They arise from cell rests or remnants from the original primordia.
3. They arise from alteration of the growth characteristics of existing cells; metaplasia during embryonic or fetal life.
4. They are atavistic phenomena, a reversion of pancreatic tissue to a more primitive type.

The fact that these lesions consist of the basic tissues of the pancreas and the biliary tree with perfect duplication of their histologic features, and that they all arise from the same area embryologically, makes it seem likely that they originate from supernumerary outpouchings of the original midgut. The wonder is, perhaps, that they are not found more frequently.

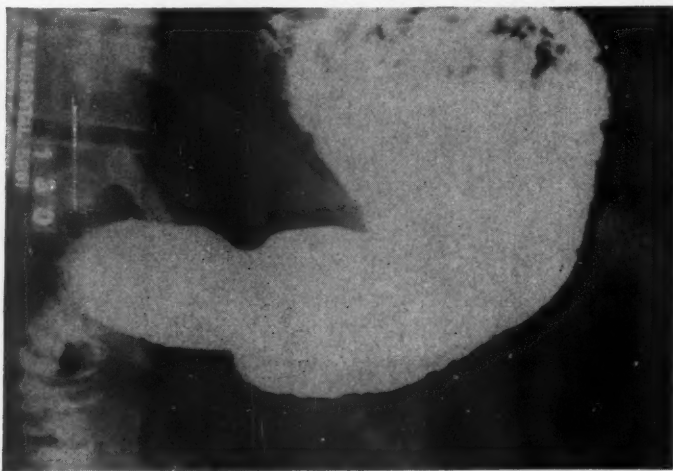


Fig. 5. Roentgenogram of a 28 year old man recently admitted to the Veterans Hospital of Seattle for evaluation of recurrent bouts of "indigestion." Careful examination of the duodenum revealed only the filling defect visualized above on the lesser curvature of the second portion. The patient elected to postpone exploration. This may be a myoepithelial hamartoma. It certainly merits exploration.

Clinically, the lesions associated with symptoms are apt to be more significant than some would infer.<sup>1</sup> If one assumes that the

figures of Hunt and Bonnesteel,<sup>3</sup> Faust and Mudgett<sup>5</sup> and others be correct, a scarce 25 per cent of these lesions, which are symptomatic, are found in the duodenum. The remaining 75 per cent are located in areas where their true nature cannot be ascertained, as in the stomach, or Meckel's diverticulum. It should be emphasized that this incidence is based on *symptomatic* lesions and not lesions found at autopsy.

When such lesions are found in the stomach on roentgenologic examination, there is often a presenting symptom complex. As in the case reported above, it is impossible to tell, even at operation, whether the lesion is a benign one, and certainly it is difficult to assess the symptoms of the patient as related to the tumor. Exploration of all such lesions in the stomach is essential. These lesions in the stomach are all prepyloric and simple excision or sleeve resection (including the pylorus) will give relief from symptoms. The knowledge of their existence will keep the surgeon from sacrificing too much stomach in mistaking an uncommon lesion for a neoplasm.

Recognizable duodenal lesions (fig. 5) have caused sufficient symptoms to warrant roentgenologic examination of the duodenum. If such lesions are found on roentgenologic examination, it would seem to be unwise to ignore them therapeutically simply because of the rarity of neoplasia in this area.

The asymptomatic minute accessory pancreas found at autopsy does not fall within the scope of this discussion for obvious reasons.

#### CONCLUSIONS

The existence of aggregations of pancreatic, biliary and intestinal epithelium in the form of small tumors in the stomach, intestine, and biliary tree has been recognized for over 100 years. These have been called "myoepithelial hamartomas," and may contain all or only one of the tissues listed. There are several theories of their origin. One theory is presented hypothesizing that they are residuals of supernumerary outpouchings of the midgut, much as the origins of the pancreas and biliary tree. This is supported by the fact that they all occur in intestinal tract coming from the same embryologic area.

A case is reported of a patient who had such a lesion in the prepyloric region of the stomach which caused disabling symptoms quite out of proportion to its size.

A plea is presented to consider all such lesions as worthy of exploration, either from a therapeutic or from a diagnostic point of view.

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## CARCINOMA OF THE FEMALE MAMMARY GLAND\*

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**T**ODAY, physicians face a direct challenge to obtain better results in treating the most common type of cancer: carcinoma of the female breast. Modern surgeons obtain few more five year survivals than Halstead and Willy Meyer, pioneer American breast surgeons, accomplished 50 years ago.

### INCIDENCE

A survey of the cancer morbidity statistics in New York State (table 1)<sup>5</sup> revealed that the breast is the most frequent site for cancer in either sex.

Sixty per cent of all types of cancer occurred in the breast; almost twice as common as carcinoma of the cervix and twice as common as carcinoma of the skin in the male, which ranks third. Four per cent of all adult women contract the disease, which is rare before the age of 25, but increases in incidence throughout the average life span.

### THE DATA

The records of all women with carcinoma of the breast admitted to Louisville General Hospital from 1934 to 1944 inclusive, are reviewed. This hospital is a city-county charity hospital which draws its patients largely from the lower educational, social and economic groups. The proportion of advanced cases of all diseases is higher than it is in private practice. The various important points in the incidence, diagnosis, treatment and survival rate are discussed. There has been no case selection. All cases are included and every death was assumed to be due to malignancy unless otherwise noted. The five year follow-up was complete for 97.5 per cent of the group; resulting in an accurate statistical incidence of survival.

There were 118 patients admitted and 92 were accepted for treatment. Twenty-six patients who were not treated included those who refused treatment after a diagnosis was made and therapy advised, patients with widespread metastases, contraindicating therapy, and a few with other fatal diseases.

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\*Aided by a U. S. Public Health Grant.

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## DISPOSITION OF CASES

Of the 92 patients treated, there were 63 radical mastectomies, 23 palliative operations, and 6 were given roentgenotherapy only.

The relative operability rate shows that few patients were denied benefit of surgery, although the high percentage of palliative operations defeated the likelihood of survival. This report illustrates the large number of patients with far advanced carcinoma seeking advice at this institution during that period. Many of the patients operated upon received roentgenotherapy in addition but the type given is deemed inadequate by modern therapists. Six patients were treated by palliative roentgenotherapy only.

## DISTRIBUTION BY AGE

Age is especially important in making a diagnosis of carcinoma of the breast. Carcinoma of the breast in 72 of the group of patients occurred between the ages of 40 and 60, illustrating the peak incidence and agreeing with other reported series of cases.

TABLE 1

*Distribution by Age*

20—30 years	1
30—40 years	11
40—50 years	36
50—60 years	36
60—70 years	26
70—80 years	8
Total	118

Any discrete lump in the breast after age 40 must be assumed to be cancer until proved otherwise. Age should not be considered when advising therapy. A radical mastectomy can be performed at any age if the patient is properly prepared and has no other debilitating disease. There are many highly malignant tumors in the aged, likewise there are many Grade I lesions in young people.

## DURATION OF DISEASE

The important factors of duration and size of the lump in the breast before treatment is instituted is illustrated in table 2.

Eighty-eight (75 per cent) of the patients presented themselves with the disease which had been present over six months; making it difficult to accomplish a cure. Haagensen's series<sup>5</sup> of cases treated

TABLE 2

*Duration of Disease Upon Admission*

One month or less.....	4
One to 6 months.....	26
Over 6 months.....	88
Total .....	118

by radical mastectomy gave the following five year survival rates when the measured size of the lump was noted on the original visit:

A. Lump under 3 cm. in diameter, 62 per cent, five year survival.

B. Lump over 6 cm. in diameter, 19 per cent, five year survival.

This large discrepancy in survival rates can be readily remedied by the education of all women to perform mid-menstrual breast examination and present themselves early for diagnosis and therapy if a lump is found.

#### EXTENT OF DISEASE

Table 3 shows the distribution of cases in relation to the extent of the disease in the 86 patients operated upon. There were only 18 (20 per cent) in which the disease was confined to the breast.

TABLE 3

*Distribution in Relation to Extent of Disease*

(86 Cases)	
1. Carcinoma of the breast without metastasis.....	18
2. Carcinoma of the breast with axillary metastasis.....	57
3. Clinical nodes (nodes not receiving palliative resection).....	11
Total .....	86

A large majority had axillary or distant metastases so that a high percentage of five year survivals was impossible. Almost all series of cases reported showed increased survival rates when the axillary nodes were not involved. The 11 cases in our series in which no nodes were reported included far advanced cases where palliative removal or biopsy section of an ulcerated breast was the only surgery advisable

#### FIVE YEAR SURVIVAL

The five year survival rate of all patients is illustrated by table 4.

One is discouraged to observe that only 22 (18 per cent) of the

TABLE 4  
Five Year Survival Carcinoma of the Breast

1. Living .....	22	18.6%
2. Dead or assumed dead.....	96	81.4%
A. Died of Carcinoma.....	60	50.8%
B. Died of intercurrent disease or of unknown cause....	28	24.5%
C. Operative deaths .....	5	3.9%
D. Not traced .....	3	2.5%
<hr/>		
Total .....	118	100.3%

women in our series of cases are living. Sixty (50 per cent) are known to have died from carcinoma. The deaths from unknown causes totaled 28 (24 per cent). The 28 together with the 4 not traced resulted in a high death rate. Likewise, one must assume that many of the latter died from carcinoma. In considering this low percentage (18.6 per cent) of five year survivals, one must realize that all cases are included, treated and untreated. No case selections with probable improved percentage was used.

#### CARCINOMA OF THE BREAST WITHOUT METASTASIS

Table 5 illustrates the encouraging figure of 10 (55.5 per cent) patients who were living at the end of five years, when the disease was confined to the breast.

Only one death was known to be due to carcinoma. We must assume, however, that the deaths from unknown causes were also due to carcinoma, thus giving in the final analysis, a fairly low survival rate. The small number of 18 cases is unimportant statistically, but illustrates a trend toward improvement when proper therapy can be administered early.

#### CARCINOMA OF THE BREAST WITH AXILLARY METASTASIS

Fifty-seven cases of carcinoma of the breast with axillary metastases were in the series.

Of this group 11 (19.3 per cent) were living at the end of five years. Thirty-three (57.9 per cent) were known to have died from their original disease. One is impressed that the survival rate in those with metastases is only one-third of the rate in those without metastases, and again demonstrates the necessity of early diagnosis and treatment. Ten of the patients died of unknown causes (probably cancer), which again lowers our survival rate.

TABLE 5

*Five Year Results of Carcinoma of the Breast*

	Breast No Metastasis (18 Cases)	Axillary Metastasis (57 Cases)	Palliative Operation Only (11 Cases)	Treated by X-Ray Only (6 Cases)	Not Treated (26 Cases)
1. Living	10—55.5%	11—19.3%	1— 9.1%	0— 0.0%	0— 0.0%
2. Died of Carcinoma	1— 5.5%	33—57.9%	3—27.2%	4—66.6%	19—73.0%
3. Died of Intercurrent Disease or of Unknown Cause	6—33.3%	10—17.5%	6—54.5%	2—33.3%	4—15.3%
	1— 5.5%	3— 5.2%	1— 9.1%	0— 0.0%	0— 0.0%
4. Operative Deaths	0— 0.0%	0— 0.0%	0— 0.0%	0— 0.0%	3—11.5%
5. Not Traced	— — —	— — —	— — —	— — —	— — —
Total	18—99.8%	57—99.9%	11—99.9%	6—99.9%	2—99.8%

## CARCINOMA OF THE BREAST, PALLIATIVE OPERATION ONLY

The 11 far advanced cases with fixed axillary nodes, ulcerated lesions, etc., in which only palliative simple mastectomy or biopsy section was done was the treatment of choice. The theory that surgery is useless, as far as survival is concerned, is well illustrated in this series of cases in which only 1 patient was living at the end of five years. However, one point of interest is raised; 1 patient out of 11 is living. Would she be living if no treatment had been given? This question must be investigated further. Likewise the kind of therapy should be investigated further. Halstead discarded supraclavicular dissection because he had a high operative mortality with an increase of only 3 per cent survival rate. Today, with our low operative mortality, shall we do supraclavicular and internal mammary node dissections in the far advanced cases? Likewise, should this be done prophylactically for early cases? That such a procedure might be feasible is apparent to us. We have seen supraclavicular nodal metastasis flare up with active growth 10 to 11 years after radical mastectomy. Activity then occurs in this node with generalized metastasis and death. If we had removed the nodal metastasis originally, perhaps a life would have been saved.

## ROENTGENOTHERAPY

The 6 patients treated only by roentgenotherapy were dead at the end of five years.

These far advanced cases treated for pain, ulceration, etc., are no index of the efficiency of such therapy. Many of the patients with axillary nodes operated upon received roentgenotherapy also as a prophylactic procedure. We believe that roentgenotherapy has a definite place in the treatment of the disease, but is not the treatment of choice if surgery is possible.

## PATIENTS NOT ACCEPTED FOR TREATMENT

Twenty-six patients who refused therapy or were considered hopeless and no treatment was advised, are dead at the end of five years. One idea gained from the results in this group is that perhaps some type of radical surgery or intensive roentgenotherapy might have saved a life. This seems worthwhile to me if by so doing, one does not cripple the patient. In reviewing the literature, many hopeless cases are not included when survival rates are reported thus improving the percentage of survival rates. Our aim as surgeons should be to obtain the best results for all cases. A recent statistical study,<sup>12</sup> when five year survival is used as an index, points

out that our actual percentage of possible improvement by treatment when considering all cases, treated and untreated, is only 5 per cent to 10 per cent. Thus, every patient in which there is any possible chance of cure must be treated and a careful analysis of the efficacy of such treatment be recorded.

TABLE 6  
*Five Year Results Radical Mastectomy*

1. Number of radical mastectomies.....	63	
2. Operative deaths .....	4	6.4%
3. Lost track of before 5 years.....	0	0.0%
4. Died of unknown causes before 5 years.....	8	12.7%
5. Died of intercurrent diseases before 5 years without evidence of recurrent carcinoma.....	4	6.4%
6. Died of carcinoma of the breast before 5 years.....	29	46.0%
7. Living with recurrence after 5 years.....	2	3.2%
8. Living without recurrence after 5 years.....	16	25.4%

#### RADICAL MASTECTOMY

Five year follow-up of radical mastectomy performed on 63 patients in this series is shown in table 6.

A discouraging figure; 16 (25.4 per cent) of the 63 patients were living without evidence of carcinoma. Over 50 per cent of the patients undoubtedly died from cancer. The operative mortality (6.4 per cent) is high, partly because there was no blood bank at our hospital before 1938. Relatives, if any, were not interested in furnishing blood for this type patient. This high figure, recently remedied, and the large number of deaths from unknown causes, produces a low survival rate.

TABLE 7  
*Five Year Results of Radical Mastectomy Expressed in Terms of Relative and Absolute Cure and Survival Rate*

1. Relative 5 year clinical cure.....	25.4%
2. Absolute 5 year clinical cure.....	12.6%
3. Relative 5 year survival.....	28.1%
4. Absolute 5 year survival.....	14.3%

Table 7 shows the five year results of radical mastectomy expressed in terms of *relative* clinical and *absolute* cure and *relative* and *absolute* survival rates as suggested by Haagensen.<sup>4</sup> This is the method which should be used for all statistical studies so that our reports may be uniform. Relative clinical cure is obtained from the patients operated upon who are living and without evidence of

cancer; while absolute cure is figured on all patients seen (118). Relative survival includes patients operated upon (18) who are living after five years whether or not cancer is present, and absolute survival considers all patients (118) seen who are living. The absolute five year clinical cure accomplished by radical mastectomy (12.6 per cent) and the relative five year survival (28.1 per cent) is used as an index in most reports. This low figure compares unfavorably with other series of selected cases for radical mastectomy, however, during that period we operated upon all cases possible. Recent relative five year survival figures from Presbyterian Hospital were 48.7 per cent, while those from Massachusetts General Hospital were 52.0 per cent. Both of these clinics, however, used case selection and did not operate upon patients with clinically advanced disease.

#### SUMMARY

Five year follow-up on 118 cases of carcinoma of the female breast admitted to the Louisville General Hospital 1934 to 1944 is reported. Various phases concerning treatment of the disease are discussed.

The relative five year clinical cure accomplished by radical mastectomy performed on 63 patients was 25.4 per cent.

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## THE ROLE OF EXCISION BIOPSY IN LESIONS OF THE BREAST

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**T**HIS paper is concerned with those solitary nodules, discharging nipples, and cases of unilateral breast symptomatology which might represent malignancy.

The material on which this discussion is based includes all breasts on which some type of surgery was performed and a very few which did not have surgery in the period from 1933 through 1951. Two hundred and three breast lesions were seen in The Myers Clinic Hospital during this time. The patients varied in age from 17 to 82 years, including four male breasts operated upon during this time. Instead of analyzing here the various presenting signs and symptoms of the cases as has been done frequently before,<sup>2,5,10,11</sup> the present plan is to take the preoperative clinical diagnoses of the attending physicians and compare them with the pathologic diagnoses. Table 1 summarizes these findings.

Of 79 cases diagnosed as carcinoma preoperatively, only 55 or 69.6 per cent proved to be malignant pathologically; nineteen were some form of cystic disease; 1 was a fibroadenoma; 1 an adenofibroma; 2 were abscesses, and 1 an intraductal papilloma. Out of 46 cases with a preoperative diagnosis of cystic disease, 6 or 13 per cent proved to be carcinoma; 29 were diagnosed correctly; 4 were fibroadenoma; 1 an adenofibroma, and 1 a plasma cell mastitis. In 1 case no tumor was found in the pathologic specimen, while in another no pathologic examination was believed to be necessary. In 3 the clinician did not believe that surgery was indicated. Unfortunately, we do not have extensive follow-up on these 3 cases. It should be mentioned here that 1 case, not included in this series, was diagnosed clinically as fibroadenoma but a biopsy specimen was not obtained. Here again the follow up is not satisfactory.

Fibroadenoma, which was diagnosed preoperatively in 33 cases, proved to be malignant in 3 instances, or 9.1 per cent; 6 cases were cystic disease; 16, or about half, actually were fibroadenomas; 7 adenofibromas, and 1 a lymph node. Of 6 adenofibromas 2 were cystic disease; 1 a fibroadenoma, and 3, again half, were correctly diagnosed. Intraductal papilloma was diagnosed preoperatively in 6 cases, only 1 of which proved to be malignant; the others included 1

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cystic disease, 1 fibroadenoma, 1 lipoma, and 2 intraductal papillomas correctly diagnosed (33 per cent).

Several rare diagnoses were made. Paget's disease was diagnosed preoperatively once and correctly so. A presumed lipoma proved to be a carcinoma. A granuloma was correctly diagnosed, but a case diagnosed preoperatively as periductal fibrosis proved to be cystic mastitis.

TABLE 1

Preoperative Diagnosis

Postoperative Diagnosis

	No.	Ca. %	Cyst	Fibro	Adeno	Abscess	Duct Pap.	No Surg.	Other
Carcinoma	79	55, 69.6	19	1	1	2	1		
Cystic Disease	46	6, 13	29	4	1			3	1 No Path. 1 No Tumor 1 Plasma Cell Mastitis
Fibroadenoma	33	3, 9.1	6	16	7				Lymph Node
Adenofibroma	6		2	1	3				
Intraductal Papilloma	6	1	1	1			2		Lipoma
Paget's Disease	1	1							
Tumor, Benign Not Spec.	4 15	1 3	1 6	1	2 1	1	1		1 Lipofibroma
Periductal Fibrosis	1		1						1 Schimmelbusch Disease
Granuloma	1					1			
Lipoma	1	1							
Abscess	10		2			6		2 (Penicillin)	
Total	203	71	67	24	15	10	4	5	7

Nineteen equivocal diagnoses of "tumor," "nodule," or "mass" appear in this series. Of the 4 thought to be benign, 1 was a carcinoma; 1 was cystic disease, and 2 were adenofibromas. Of the remaining 15, 3 were malignant. The others were diagnosed as follows: 1 fibroadenoma; 1 abscess; 1 intraductal papilloma; 1 lipofibroma, and 1 as Schimmelbusch's disease.

TABLE 2  
*Carcinoma without Clinical Skin Involvement, Fixation or Nodes*

	Preop.		Postop.
Total Cases	Ca.	Others	Ca.
27	14	13	27

Of the 10 cases diagnosed preoperatively as abscess, 2 proved to be cystic disease; 6 inflammatory lesions, and 2 were treated with penicillin without biopsy specimen.

From table 1, it is also possible to take any given pathologic diagnosis and note the varying preoperative diagnoses. Thus the 71 cases of carcinoma were misdiagnosed in 15 instances preoperatively or 21 per cent of the cases, which is quite an error if not corrected. Table 2 shows this error if we remove from consideration those cases which obviously could be diagnosed as carcinoma. These figures were obtained by eliminating those obvious cases of advanced carcinoma as indicated by skin involvement, fixation, and/or axillary node enlargement. There remained 27 clinically early cases, whose prognosis after radical surgery is good; but only 14 or about 50 per cent were correctly diagnosed preoperatively.

TABLE 3  
*Male Breast*

Preop.	Postop.
2 Carcinoma	1 Carcinoma 1 Gynecomastia
1 Gynecomastia	1 Gynecomastia
1 Abscess	1 Abscess

TABLE 4  
*Previous Biopsies of Other Breasts*

1st Diag.		Preop.		Postop.	
Ca.	Benign	Ca.	Benign	Ca.	Benign
	2		2		2
4			2	1	1
		2			2

The 4 male breast tumor cases are listed in table 3. Of the 2 preoperative diagnoses of carcinoma, 1 proved to be correct but the other proved to be benign gynecomastia. One case was correctly diagnosed gynecomastia and the other was a breast abscess. From those figures, it is apparent in a large number of cases that the correct diagnosis could be reached only by biopsy specimen and microscopic examination.

An interesting situation arises where, following surgery, a lesion develops in the other breast. Table 4 summarizes 6 cases of this nature. In 2 of these cases, cystic disease was found in the other breast also. In 4 cases of carcinoma, where the other breast was explored for a definite lesion, 2 were thought to be malignant preoperatively but proved to be benign, while of the 2 preoperatively considered benign, 1 proved to be malignant. It would appear then that a lesion in the contralateral breast should also be explored.

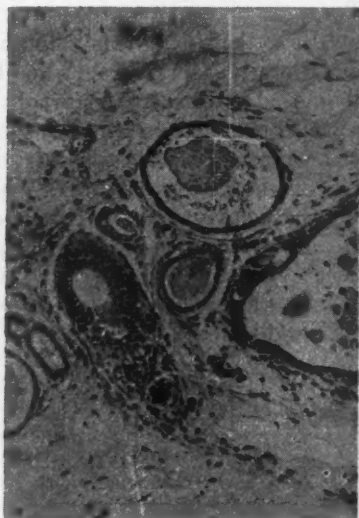


Fig. 1. Chronic cystic mastitis (X 120).



Fig. 2. Carcinoma of the breast (X 120).

#### DISCUSSION

Accurate diagnosis is a worthy goal. Saphir<sup>11</sup> has described a method of cytologic examination of discharges from the nipple, but he missed 3 carcinomas in 28 cases and concludes that the surgeon should be prepared to look for carcinoma anyway. Haagensen<sup>6</sup> states that only 2 per cent of a large series had any discharge. As has been done before by both pathologist<sup>11</sup> and clinician,<sup>9</sup> the term

cystic disease in this paper has been used to indicate a variety of cystic changes in the breast, with all degrees of proliferation (fig. 1). In fairness to the pathologist, it should be stated that these cases were all accurately diagnosed; the diagnoses in the majority of cases covering more than one typewritten line. Cystic disease, or chronic cystic mastitis occurs in 93 per cent of autopsy cases<sup>8</sup> and 82.4 per cent of breasts removed for carcinoma.<sup>9</sup> It is not within the scope of this paper to discuss the various forms of epithelial hyperplasia, but it should be pointed out very emphatically that the pathologist could not have made his accurate diagnoses had not the surgeon intervened with excision specimens, and presented him with adequate specimens for examination.

The next point for consideration is the importance of early diagnosis. It has been repeatedly shown that treatment of early malignant lesions gives a higher percentage of five year cures. Taylor



Fig. 3. Fibroadenoma of the breast (X 120).



Fig. 4. A nodule in the breast.

and Wallace<sup>12</sup> report a 33 per cent five year survival in cases with axillary metastasis, while there is a 77 per cent survival rate in cases without involved nodes. Haagensen and Stout<sup>5,6</sup> report similar figures. Our figures show a 21 per cent preoperative diagnostic error for all cases of carcinoma (table 1). If we eliminate those advanced cases which have only one chance in three of a cure and look at those clinically early cases (table 2), we find that the pre-

operative diagnostic error has increased to 50 per cent. Of 19 cases with a preoperative diagnosis of "tumor," 15 occurred within the past two and one-half years. The failure to make a more definite preoperative diagnosis, has probably resulted from the acknowledged inability to prognosticate the nature of a mass by clinical examination only. The tendency, therefore, is to simply diagnose a tumor and await the pathologist's report as to its nature. Nevertheless, if we are to surgically cure more early cases of carcinoma, we must obtain a biopsy specimen before the classical signs of advanced carcinoma appear (fig. 2). An excised adenoma is cured (fig. 3), and an incised abscess is drained, so that surgery is beneficial in any case.<sup>10</sup>



Fig. 5. Excision biopsy by electro-surgery.

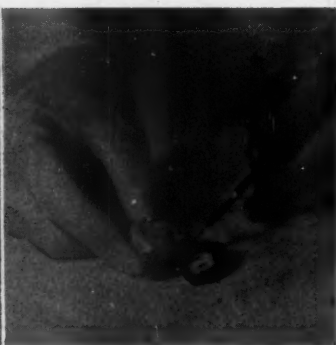


Fig. 6. Pathologic examination.

The method of taking biopsy specimens has been discussed frequently. The limitations of needle biopsy specimens are well known.<sup>6</sup> Haagensen and Stout<sup>6</sup> recommend wedge resection except in small lesions. They fear local recurrence, but quote figures to disprove this, *i.e.* 18 per cent local recurrence in cases without biopsy specimens, and 14 per cent local recurrences in cases with biopsy specimens. Of course the former were more advanced and precluded the need for biopsy specimens while increasing the chance of recurrence. As for wedge resection of a tumor being less likely to spread malignant cells, than cutting across possibly involved lymphatics, the reasoning is hard to follow. With the use of electrosurgery, these lymphatics are sealed immediately, and, unless the tumor is exceptionally large, it may usually be removed in its entirety.

Oberhelman<sup>9</sup> recommends the use of the inframammary incision of Warren<sup>18</sup> and removal of the entire lesion. What he does with the widely exposed raw surfaces when this lesion proves malignant,

he does not say. He does describe the passing of a fine probe into a bleeding duct to facilitate locating and excising an intraductal papilloma. This may be the best method of locating a small lesion, using sharp dissection. If it does then prove to be malignant on frozen biopsy section, the wound may be treated with formalin and redraped.<sup>5,6</sup>



Figs. 7 and 8. Extent of operation depends on pathologist's report.

We routinely employ electrosurgery in all cases except early intraductal papillomas close to the nipple (figs. 4, 7). The entire nodule is excised with the usual precautions against squeezing the tumor and rough handling.<sup>6,8,10</sup> The electrosurgery has killed the malignant cells contacted, and left a burned surface on which transplants will not grow. If the lesion is proved to be benign, the burned skin edges may be excised for more rapid healing. If malignant, radical mastectomy is performed as described well by McGraw<sup>8</sup> and Haagensen and Stout (ultra-radical).<sup>6</sup>

#### SUMMARY AND CONCLUSION

A review of 203 lesions of the breast has shown a significant discrepancy between preoperative and pathologic diagnoses. This discrepancy increased when the advanced and obvious cases of carcinoma were eliminated. To diagnose these early lesions and thereby cure more patients with carcinoma we agree with many other authors<sup>6,8,9,10</sup> that all tumors of the breast should be excised and examined microscopically. The advantages of an excision biopsy specimen with electrosurgery have been briefly mentioned. As long as radical mastectomy remains the treatment of choice in breast carcinoma an excision biopsy specimen should be employed

routinely in those solitary nodules, discharging nipples and cases of unilateral breast symptomatology which might represent malignancy.

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## SELF EXAMINATION OF THE BREASTS

Cancer of the breast kills more women between the ages of 40 and 60 than any other disease. One woman out of every five over the age of 40 will develop cancer. The most frequent site of cancer in the female is in her breasts and, as a result, over 20,000 women in the United States die of this disease every year. Ninety-eight per cent of the tumors of the breasts are discovered by patients accidentally while only 2 per cent are found by physicians during routine physical examinations. The average size of cancer of the breasts is 4.8 cm. (almost 2 inches in diameter) when the patient first consults her physician. We know that a woman, any woman, could feel a lump 1.5 cm. (about  $\frac{1}{2}$  inch) in diameter in her breast if it is present. It is estimated that from 8 to 12 months are required for cancers of the breast to grow from 1.5 cm. in diameter to 4.8 cm. in diameter. Over 90 per cent of the patients who have a cancer no larger than 1.5 cm. in diameter have a five year survival while the rate of all cancers of the breast at the present time is about 35 per cent of five year survivals for the country at large. In other words, if the women could find these cancers in their breasts

an average of from 8 to 12 months earlier than they are now discovering them, we would have 90 per cent of five year survivals of patients with cancers of the breast, rather than 35 per cent.

It has been estimated that after a cancer begins growing, it will reach the size of 1.5 cm. in diameter within about two months time. Obviously, the patient can't come to see her physician every two months, but she could examine her own breasts each month. If every woman were to examine her breasts every month, then no cancer could ever reach the far-advanced stage without her knowledge.

An examination procedure is one which every female should learn. It is patterned after the same procedure that physicians use in examining breasts. It is easy to learn and easy to do. After a few months, the patient will have learned the normal contours of her own breasts and will be able to detect small variations in her breasts very easily. She should be instructed that when she does find variations or lumps, then she should, without delay, consult her physician to determine the nature of these variations. Remember that only a few cancers of the breast are painful in the beginning; most of them are small hard lumps. If a lump is cancer and a woman has been examining her breasts regularly, then you and she can rest assured that she has a much greater chance of cure, for you know that it has been growing only a short time. Had she not been examining her breasts regularly, then it might have been months before she would have accidentally noticed a lump, and by that time it might have been too late.

We therefore, believe that every woman should set up a regular monthly schedule for breast examination. Make it another good health habit. We suggest to our patients that the examinations be made on Sunday following their menstrual period. Sunday is suggested because it is usually the day that she can spare a few minutes to herself and since physicians offices are, almost without exception, open on Monday they could see her in case she did find some suspicious area. The reason for selecting the time after the menstrual period is because the temporary tenderness and swelling, that is normally found in the breasts just before and during menstruation, has by then disappeared. If patients are going to detect breast cancer in its early stages by examining their own breasts, they must be thorough. It is the duty of physicians to teach them how to examine their breasts in a systematic manner. It should be stressed that this technic will be useless if they allow the habit to lapse after a few months.

It should further be stressed that frequent breast examinations should help prevent the worry with which some women seem to be

plagued. It will give them reassurance when they find no change in their breasts and likewise it will give them reassurance that, if they do find a cancer, there is a 90 per cent chance that they have found it in time.

I would like to quote from the Texas Cancer Bulletin: "Throughout the history of warfare, the simplest, most obvious weapons have often turned the tide of some great battle. So it is, potentially, in today's war on cancer of the breast—womankind's greatest enemy among malignant tumors. The x-ray machines and skilled medical minds are secondary forces, held ready to combat the foe, cancer, when his attack is discovered. But it must first be discovered. The enemy must be recognized before he may be fought. Thus, the victim becomes the front line of defense. Upon her vigilance depends the success of science in controlling disease."

A. H. LETTON, M.D.

## BOOK REVIEWS

*The Editors of THE AMERICAN SURGEON will at all times welcome new books in the field of surgery and will acknowledge their receipt in these pages. The editors do not, however, agree to review all books that have been submitted without solicitation.*

**RADIOLOGIC DIAGNOSIS OF THE LOWER URINARY TRACT.** By DONALD E. BEARD, M.D., WILLIAM E. GOODYEAR, M.D., Assistants in Urology, Emory University School of Medicine, and H. STEPHEN WEENS, M.D., Professor and Chairman, Department of Radiology, Emory University School of Medicine. First edition. Cloth. \$6.50. 150 pages with 280 Illustrations. Springfield, Ill., Charles C Thomas.

The authors have compiled a superbly illustrated Atlas for urologists and roentgenologists. However, it may well prove most valuable to the practitioner who has need only occasionally for this type of visualization of the lower urinary tract. This is especially true regarding accurate interpretation of the resulting radiograph. The brief, large type text is concise and remarkably adequate. There are 280 excellent reproductions of original radiographs. A number of these possess superimposed anatomical sketches by artist Kathleen Mackay, leaving little chance for erroneous interpretation by the reader.

The technic for urethrography and cystography are presented with a practical simplicity which belies their more widespread employment. The authors aptly point to these valuable procedures as supplements to other methods of urological examination in most conditions, but they also call attention to conditions in which urethrography and cystography alone furnish all information necessary for an accurate diagnosis. The latter is notably true in traumatic rupture of the urethra and bladder. Many pathologic lesions of the lower urinary tract can be removed from a position of relative obscurity by these technics. Attention is called to the informative graphic record which may be used as a basis for the best possible management (as well as for medico-legal purposes).

Most of the material in the book was secured while the urological authors were serving their residences at a large municipal charity hospital where an endless source of clinical material was available. The experience gained in 2000 case studies has been attractively condensed into a ready source of information for the convenience of the busy physician.

CHARLES EBERHART, M.D.

**A TEXTBOOK OF ORTHOPEDICS WITH A SECTION ON NEUROLOGY IN ORTHOPEDICS.** By M. BECKETT HOWORTH, M.D., Clinical Professor of Orthopedic Surgery, New York University Post-Graduate Medical School, New York. Formerly Assistant Clinical Professor of Orthopedic Surgery, College of Physicians and Surgeons, Columbia University; Associate Attending Surgeon, New York Orthopedic Hospital. In association with DR. FRITZ J. CROMER and others. Philadelphia, W. B. Saunders Company. Cloth, 1110 pages and illustrations. \$16.00.

There has long been needed in orthopedics such a book as this. The author has had many years of experience in the teaching and practice of this specialty.

The first portion of the book deals with the basic principles, the history of orthopedics, the anatomy of the musculoskeletal system, the principles of examination and diagnosis, and the fundamental principles of treatment.

The second section is concerned with regional orthopedics. An extremely good discussion of posture is presented in the fifth chapter. The following chapter is devoted to the spine and is exceptionally well written. A fairly comprehensive review of scoliosis is given.

Dr. William J. Littler contributed the chapter on the hand and wrist. This undoubtedly is one of the best sections in the book, and contains many valuable points. It is written in a clear and concise style and nicely illustrated.

The third section is concerned with orthopedic disorders and includes congenital deformities, orthopedic infections, fractures, arthritis, vascular disease, metabolic and endocrine diseases and bone tumors. A final section concerns neurology as related to orthopedics. This is well-prepared and makes the value of this book more definite.

The photographs and radiographs are good and the references which are listed at the end of each chapter complete. It is easily readable and perhaps the best of the current texts on orthopedics.

WOOD W. LOVELL, M.D.

*Books received are acknowledged in this section, and such acknowledgment must be regarded as a sufficient return for the courtesy of the sender. Selections will be made for review in the interests of our readers and as space permits.*

ARCHITECTURAL PRINCIPLES IN ARTHRODESIS. By H. A. BRITAIN, O.B.E., M.A., M.Ch., F.R.C.S., Director Orthopedic Services, Norfolk and Norwich Group of Hospitals, Hunterian Professor, Royal College of Surgeons, England, etc., with foreword by SIR HARRY PLATT, M.D., M.S., F.R.C.S., F.A.C.S. (Hon.), Emeritus Professor of Orthopedic Surgery, University of Manchester, President of the International Orthopedic Society, Consultant Adviser in Orthopedics, Ministry of Health. 2nd Ed. Baltimore, The Williams & Wilkins Company, 1952.

PROSTATECTOMY A METHOD AND ITS MANAGEMENT. By CHARLES WELLS, Professor of Surgery, the University of Liverpool. Baltimore, The Williams & Wilkins Company, 1952. \$5.00.

POST-GRADUATE LECTURES ON ORTHOPEDIC DIAGNOSIS AND INDICATIONS, VOL. IV. By ARTHUR STEINDLER, M.D., F.A.C.S., Professor of Orthopedic Surgery State University of Iowa, Iowa City, Iowa. Springfield, Illinois, Charles C Thomas, 1952. \$9.75.

MANUAL OF GYNECOLOGY. By E. S. TAYLOR, M.D., Professor and Head of the Department of Obstetrics and Gynecology, University of Colorado School of Medicine, Denver, Colorado. Philadelphia, Lea & Febiger, 1952. \$4.50.

THE FOOT. BY NORMAN C. LAKE, M.D., M.S., D.Sc (Lond). F.R.C.S. (Eng.), Senior Surgeon and Director of Surgical Division, Charing Cross Hospital, Emeritus Consulting Surgeon, Bolingbroke Hospital, Director of Studies, London Foot Hospital, Member of the Court of Examiners of the Royal College of Surgeons, Late Senior Examiner in Surgery, University of London and External Examiner in Surgery, Victoria University, Manchester. 4th Ed. Baltimore, The Williams & Wilkins Company, 1952. \$5.50.

ESTUDOS CIRURGICOS, 6 a Serie. By EURICO BRANCO RIBEIRO, Diretor do Sanatorio Sao Lucas, Sao Paulo Editora S. A. imprimiu. 1952.

## ABSTRACTS FROM CURRENT LITERATURE

**SPLANCHNIC BLOCK IN THE TREATMENT OF ACUTE PANCREATITIS.** W. Andrew Dale. *Surgery* 32: (Oct.) 1952.

Herein, Dale reports the results of splanchnic block in 8 cases of acute pancreatitis. Four of these were treated by bilateral paravertebral block from T-6 or T-12 in a manner similar to that usually employed in lumbar paravertebral block. The other 4 were treated by deep unilateral splanchnic block on the left with radiographic control. One death which occurred shortly after the injection was attributed to the procedure. The immediate results in all instances were good, and Dale while emphasizing the possible dangers of this treatment, feels that the method warrants further use not only for control of symptoms but also to alter the course of the disease in selected cases.

R. H. S.

**MAYDL JEJUNOSTOMY. TECHNICAL AND METABOLIC CONSIDERATIONS.** E. S. Britnall, Kate Daum, and N. A. Womack. *Archives of Surgery* 65:367-372. (Sept.) 1952.

The authors have utilized the Maydl operation in 34 instances during the past four years. It has provided an unusually satisfactory feeding fistula. This type of jejunostomy has its greatest application in patients for whom oral feedings are not possible because of obstruction of the pharynx, esophagus, or stomach by inoperable carcinoma. The authors find it preferable to a permanent gastrostomy.

The following advantages are listed:

"1. A large feeding stoma is provided through which thick formulae can be administered, with the use of a large-bore rubber feeding tube.

"2. No indwelling rubber tube is required. Between feedings a small gauze pad is applied over the enterostomy.

"3. There is no tendency for spontaneous and premature healing of the fistula.

"4. The procedure does not involve infolding of the jejunal wall, hence no narrowing of the bowel lumen occurs.

"5. With minimal instruction the patient and family view the feeding procedure with less trepidation than if an indwelling tube is present.

"6. The area is odorless and the surrounding skin is not irritated. Leakage of bile and pancreatic juice and regurgitation of feedings do not occur if the technical procedure is properly carried out. Such leakage is often seen in the permanent gastrostomy or the von Eiseler jejunostomy.

"7. Large feedings administered at frequent intervals are well tolerated.

"8. When a patient is able to take a small amount of food by mouth, supplemental feeding is much easier through the use of the Maydl jejunostomy.

"9. Food intake can be regulated to such an extent that weight gain has frequently been encountered."

A proper technical procedure for performing this jejunostomy is included. Briefly, the operation consists of division of the jejunum about 10 inches below the ligament of Treitz with anastomosis of the proximal end to the side of the distal loop about 20 inches from the point of division. The end of the distal segment is brought out through the incision or a stab wound.

The authors conclude that an adequate nutritional intake can be pleasantly, safely, and conveniently obtained by this method of feeding.

R. H. S.

CRITICAL EVALUATION OF JEJUNOSTOMY. Thomas Boles and Robert M. Zollinger. *Archives of Surgery* 65:358-366. (Sept.) 1952.

During the four years preceding this report, 103 jejunostomies were performed at the University (Ohio State University School of Medicine) Hospital. Of these, 85 were performed as complementary procedures at the time of a primary operation. Seven were done as primary procedures, 7 as preliminary preparation for definitive surgery, and 4 were done in the postoperative period. In this latter group, the operation was elected only because gastrostomy or gastroenterostomy were not feasible. The review of these cases forms the basis for over-all evaluation of the procedure by the authors. In 27 instances, the procedure was deemed to be of great value. In 56 cases, it was classified as being definitely worthwhile. In 20 cases it proved to be of little or no value.

In 88 cases, the tube feedings were well tolerated. Adjustments in volume or concentration were often necessary to control cramps, distention or diarrhea. These adjustments did not impair the efficiency of the enterostomy.

No serious complications resulted from the jejunostomies in this series. The authors, from their study, reached the following conclusions:

"1. The indications for jejunostomy are relatively uncommon, but in appropriate situations its use is often of great value.

"2. A formula with homogenized milk as its basic ingredient is well tolerated in about 85 per cent of the cases.

"3. This formula may be enriched with protein hydrolysate, carbohydrate hydrolysate, vitamins, bile, and potassium when these are indicated. The addition of an emulsifying agent, sorethytan (20) monoleate ("tween 80") improves the efficiency of the fat absorption.

"4. Jejunostomy is advocated in patients who have suffered marked loss in weight or who fall into the elderly poor risk cardiac classification in whom such procedures as extensive gastrectomy or complicated biliary tract and pancreatic operations are needed.

"5. The procedure should also be kept in mind as a sound method for handling the postoperative complication of a prolonged malfunctioning gastrojejunal stoma."

R. H. S.

THE EFFECT OF DOUBLE VAGOTOMY ON THE MOTOR ACTIVITY OF THE HUMAN GALLBLADDER. Frank E. Johnson and E. A. Boyden. *Surgery* 32:591-601. (Sept.) 1952.

Though section of the vagus nerves in laboratory animals markedly delays emptying of the viscus, experimental evidence suggests that the nervous control of the extrahepatic biliary system in man has been lost and that evacuation of the gallbladder depends primarily on the humoral mechanism. The recent revival of vagus nerve section in the treatment of peptic ulcer has presented an opportunity for directly testing the role of the nervous system in gallbladder function.

The authors studied the gallbladder function roentgenologically both preoperatively and postoperatively in 13 men who were healthy in all respects except for long standing duodenal ulcer. Eleven of the patients had normal

cholecystograms both before and after operation. The authors divide these patients into two groups. The first group of 5 patients were considered to be the control group since physiologic tests indicated that the vagotomy had been incomplete. With one exception, explainable on other grounds, the patients in this group continued to exhibit rapid emptying of the gallbladder after operation. The remaining 6 patients were considered to have complete section of the vagus nerves. The patients in this group exhibited marked retardation of the emptying of the gallbladder but the rate was not less than that of normal individuals of corresponding sex and age. The loss of tonus was evidenced by the increase in the fasting volume of the gallbladder which was about double that of the preoperative state. The gallbladder under these conditions seems to undergo steady enlargement. The authors raise the question as to whether such enlargement may lead to gallbladder disease.

R. H. S.

RISK OF URGENT SURGERY IN PRESENCE OF MYOCARDIAL INFARCTION AND ANGINAL PECTORIS. F. A. dePeyster, O. Paul, and R. K. Gilchrist. *Archives of Surgery* 65:448-456. (Sept.) 1952.

The progress of medical science has brought to the surgeon a greater number of patients with degenerative cardiac changes. Among these patients are those with myocardial infarction or angina pectoris who also harbor disease requiring urgent surgical intervention. In many instances, the indicated operation is of major magnitude requiring thoracotomy or celiotomy. Since the evaluation of the combined experience of various groups must be considered in studying this problem, the authors feel that it is essential for uniform standards and criteria to be utilized.

In the present study, the records of 33 patients with myocardial infarction and 7 patients with severe angina pectoris, all of whom were subjected to urgent surgery, are analyzed. No case was included in which the evidence of infarction or angina could be doubted. As a result of this study, dePeyster and his co-workers were able to make the following observations and recommendations:

"1. Patients experiencing recent myocardial infarction (less than three months before operation) should not be subjected to major surgery unless an emergency exists.

"2. The prevention of hypoxia during anesthesia is essential, particularly in the presence of known myocardial infarction. The more frequent use or complementary local anesthesia, thus reducing the amount of primary anesthetic agent, will aid in this objective.

"3. Because of the significant association fatal pulmonary embolism occurring in aged patients with myocardial infarction subjected to prolonged surgery, it is recommended that appropriate measures be instituted to reduce the possibility of intravascular coagulation during the immediate postoperative period.

"4. It is recognized that there is no substitute for a careful history and physical examination. However, for all patients more than 45 years of age on whom major surgery is contemplated an electrocardiogram should be made to ascertain the presence of suspected coronary disease."

The survival rate in this series was only 37 per cent.

R. H. S.

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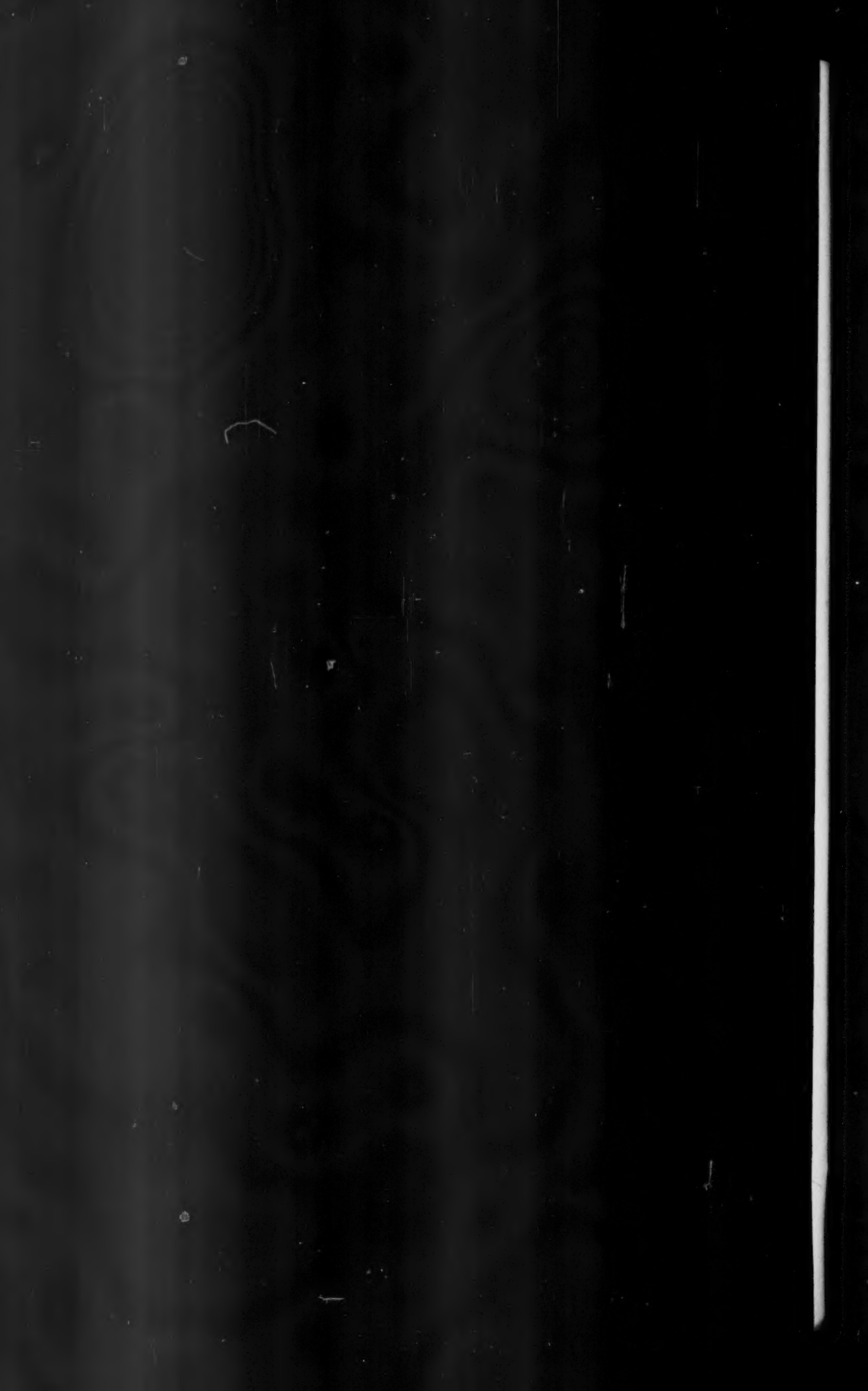
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